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ABSTRACT

The National Science Foundation's (NSF) Statewide Systemic Initiatives (SSI) Program is a major effort by NSF to encourage improvements in science, mathematics, and engineering education through comprehensive systemic changes in the educational systems of the states. The SSI Program represents a strategy to strengthen the infrastructure for science and mathematics education through alignment of state policies and resources. This effort requires collaboration of educators at all levels, business and industry, parents, and the community at large. This publication describes the individual state initiatives funded through the SSI Program and focuses on state accomplishments and impact. Each state profile lists contact person information, state background, vision, strategy, accomplishments, and important partners and alliances. Presently, 24 states and Puerto Rico have five-year SSI awards: Arkansas, California, Colorado, Connecticut, Delaware, Florida, Georgia, Kentucky, Louisiana, Maine, Massachusetts, Michigan, Montana, Nebraska, New Jersey, New Mexico, New York, North Carolina, Ohio, South Carolina, South Dakota, Texas, Vermont, and Virginia. An appendix lists principal investigators with positions/affiliations in addition to SSI. (MKR)

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State Profiles

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Statewide Systemic Initiatives In Science, Mathematics, & Engineering

1994-1995

ED 380 286

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Preface

This is the second edition of the *State Profiles* publication, which describes the individual state initiatives funded through the National Science Foundation's (NSF) Statewide Systemic Initiatives (SSI) Program. This year, the publication particularly focuses on state accomplishments and impact.

The SSI Program is a major effort by NSF to encourage improvements in science, mathematics, and engineering education through comprehensive systemic changes in the education systems of the states. The SSI Program was initiated in 1991 and resulted in three rounds of competition. Presently, twenty-four states and Puerto Rico have five-year awards.

The SSI Program represents a strategy to strengthen the infrastructure for science and mathematics education through alignment of state policies and resources. This requires the collaboration of educators at all levels, business and industry, parents, and the community at large.

States are selected for funding through a rigorous merit review process that includes preliminary proposals, panel reviews of full proposals and site visits. Selection and continuation are based on: (1) state commitment to fundamental reform of mathematics and science education, including appropriate enabling policies and resource alignment; (2) the quality of the state's vision for mathematics and science education including state frameworks, professional development programs, assessments, and the quality of mathematics and science programs implemented in local schools and districts; (3) an equity plan that ensures that the SSI includes high quality mathematics and science for all students; (4) partnerships that enable the effort to succeed and sustain itself after NSF funding ends; (5) a plan for effective management and oversight; and (6) an evaluation plan that encourages mid-course corrections.

NSF's Directorate of Education and Human Resources (EHR) has responsibility for science, mathematics, engineering, and technology education. The SSI program is managed by EHR's Office of Systemic Reform (OSR).

SSI awards are made through cooperative agreements, enabling SSI staff to work closely with the states, and states are able to change direction and take advantage of new opportunities with relative ease.

The SSI Program provides support to the states on issues such as leadership development, strategic planning, materials selected, equity, assessment, public awareness, and project evaluation. The program also maintains an electronic network, conducts biannual meetings, and provides leadership institutes so states can learn from each other. Ongoing monitoring of the SSIs is provided through NSF's Division of Research, Evaluation and Dissemination (RED). RED also overseas a multi-year evaluation of the SSI Program to determine the effectiveness of strategies for change, the extent to which significant policy changes occurred, and the improvements in science and mathematics education and student achievement.

Luther S. Williams, Assistant Director,
Education and Human Resources Directorate,
National Science Foundation

For further information regarding the SSI Program, please contact:

Janice Earle, Senior Program Director,
Statewide Systemic Initiatives Program,
Office of Systemic Reform

Carolyn Mahoney, Program Director,
Statewide Systemic Initiatives Program,
Office of Systemic Reform

Julia C. Wan, Program Director,
Statewide Systemic Initiatives Program,
Office of Systemic Reform

National Science Foundation
4201 Wilson Boulevard, Suite 875
Arlington, VA 22230
Phone: 703-306-1682
Fax: 703-306-0456

Arkansas

Governor: Jim Guy Tucker

Principal Investigators: Edward Crowe, Diana Julian

Point of Contact: Suzanne Mitchell, Project Director
Arkansas Department
of Higher Education
114 East Capitol Avenue
Little Rock, AR 72201
Phone: 501-324-9300
FAX: 501-324-9308
EMail: smitchel@ssi.edc.org

5-Year Award: $10,000,000

Context

Arkansas has witnessed the effects of an increased emphasis on higher education. Since 1982, the rate of college-going students has increased from 38% to 52%, and the number of high school graduates who complete a rigorous program of precollege preparation has increased by nearly one-third since 1989. Employment in the state is shifting rapidly from agriculture to service and manufacturing. Even with these changes, however, the state ranks 49th in persons with college degrees and 49th in median family income. Its 1992 population of 2,372,000 ranked it 33rd in the nation, with 83% of the population Caucasian, 16% African American, 1% Hispanic, and 1% other.

Vision

The Arkansas SSI promotes the restructuring of mathematics and science education by (1) changing attitudes toward mathematics and science; (2) improving student and worker skills; and (3) fostering long-term community involvement in the education system.

Strategy

In five designated regions, business and education partnerships, plus broad-based coalitions, function as management structures to expand the mathematics and science alliances, build networks of communication, and foster public support for mathematics and science education. The Arkansas initiative is developing K–16 mathematics and science leadership, applying the principles and practices of the Arkansas Math Crusade and the upcoming Science Crusade. These efforts link to state efforts in the development of mathematics and science curriculum frameworks. Policies and practices at the college level are targeted to effect these changes and the related teacher certification reforms. Classrooms are being equipped with appropriate materials and technology to effectively implement new curricula . The five regions and every school are being linked through a computer network.

Accomplishments

1. ***Teacher Training and Professional Development***
As of fall 1994, 1,200 mathematics teachers, grades 5–16 (20% of mathematics teachers in the state), have received extensive training and equipment through the Arkansas Math Crusade. In addition, 1,000 elementary teachers, K–4, have received training that integrates mathematics, science, and reading through the Arkansas K–4 Crusade. Seventy-two science teachers have been prepared as trainers to teach in the Science Crusade, scheduled to begin in January 1995. The Math and Science Crusades provide integrated content and instructional strategies for teachers through graduate courses that incorporate hands-on investigations, cooperative learning, writing, performance assessment, and calculator technology. Several colleges incorporate strategies from the Crusades into their preservice courses. All districts in the state have written local mathematics frameworks; all will write local science frameworks in 1994–95.

2. ***Integrated and Applied Academics Curriculum***
An integrated curriculum for the Arkansas K–4 Crusade has been developed that blends mathematics, science, and reading and interfaces with the statewide curriculum frameworks. Project Math and Science Together (MAST), an NSF-funded project for grades 2–6 has been expanded statewide in grades K–1. A course called Investigating Geometry has been developed as a companion course to the Applied Math I and Applied Math II courses that are currently offered. This problem-based, hands-on geometry curriculum will reach 9,000 students during the 1994–95 school year.

ARKANSAS CRUSADES

3. *Leadership Training*

In collaboration with the Southwest Education Development Laboratory, the Arkansas initiative sponsored a Math and Science Leadership Conference during the summer of 1994 for more than 473 prospective leaders in mathematics and science, making it the largest statewide mathematics conference ever held in Arkansas. Across the state, five Regional Partnerships have been funded, which, along with the Academy for Leadership Development, help to identify a mathematics/science leader in every school in Arkansas and provide leadership and resource support at the regional and local levels.

4. *Leadership Activities*

Through Project Strive, 55 mathematics and science teachers were placed in research settings for summer experiences in 1994, and scientists and mathematicians were brought into classrooms to work with students. Over 400 teachers have joined Academic Alliances, created at the local level to increase communication among school and college faculty in the same disciplines. Partnerships are being formed to involve parents, educators, mathematicians, scientists, and local community leaders in important education system roles. Specifically, mathematics and science outreach information has been disseminated to communities through local county fairs; a nine-member SSI Speakers Panel makes regular presentations to various civic groups; and the Arkansas Council of Teachers of Mathematics (ACTM) and the Arkansas Science Teachers Association (ASTA) host statewide meetings several times a year. ACTM collaborated with two businesses to produce a mathematics professional events calendar that was mailed to every school and college in the state.

Important Partners and Alliances

The Arkansas initiative is governed by a Steering Council whose members are broadly representative of the partners involved. These include staff from the state departments of education and higher education, the governor's and legislative offices, the Science and Technology Authority, public and commercial broadcasting, the PTA, state mathematics and science organizations, industry, university education and content departments, mathematics/science Presidential Award recipients, school administrators, mathematics coalition, and NSF project participants.

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Vickie Thornton and Beverly Bedwell, high school teachers, complete a "hands-on" learning activity on electricity during the first teacher training activity of the Arkansas Science Crusade.

California

Governor: Pete Wilson

Principal Investigators: Maureen DiMarco, Harvey Hunt, Ellen Switkes

Point of Contact: Robert Polkinghorn, Director
Academic Collaboratives in Education
University of California
300 Lakeside Drive, 18th Floor
Oakland, CA 94612-3550
Phone: 510-987-9505
FAX: 510-987-9612
EMail: robert.polkinghorn@ucop.edu

5-Year Award: $10,000,000

Context

California has roughly 12% of the nation's population but more than 20% of its technological work force. High tech, defense, and agribusiness are the backbone of California's economy, with small businesses becoming an important source of new jobs. One out of every seven babies in the United States is born in California. The state's K–12 public school enrollment approaches 5,000,000 students every year, adding to a school population rich in ethnic and cultural diversity. Approximately 90 different languages are spoken by Los Angeles public school students alone. Children classified as having limited English proficiency constitute 25% of each incoming kindergarten class; over half of the state's school-age population is Hispanic, African American, or Asian.

Vision

The California Alliance for Mathematics and Science (CAMS) Initiative fosters mathematics and science literacy among all California students. CAMS works with schools to assist them in transforming their programs so that students experience a meaning-centered mathematics and science curriculum. To achieve this, the CAMS initiative will create a strong and lasting alliance among parents, teachers, principals, superintendents, university scientists and mathematicians, community organizations, business, industry, labor, and political leaders.

Strategy

Since the early 1980s, California has shifted its thinking about education from a fact-based "factory" model to a comprehensive plan that establishes a meaning-centered curriculum for all students. This plan has put into place several strategies that function as major leverage points for systemic change. Among these are the California Frameworks for Mathematics and Science, which forms the foundation for curriculum improvement; state-adopted instructional materials and statewide authentic assessment that support the content and pedagogic tenets of the Frameworks; and program quality reviews for schools' self-study of the effectiveness of their mathematics/science programs. The CAMS initiative builds on these strategies and forms a coalition of people, programs, policies, and resources dedicated to increasing the quality of learning in mathematics and science. CAMS functions as an umbrella for reform by bringing together diverse groups—such as the California Science Project; Scope, Sequence, and Coordination; the California Schools Leadership Academy for Administrators; and Goals 2000—for the construction and implementation of the common vision.

By concentrating on middle school mathematics and elementary science, the SSI plans to prepare all students for matriculation into high school college-preparatory coursework. CAMS consists of three components:

- The California Science Implementation Network (CSIN), which promotes schoolwide change by building site-based leadership capacity and providing a curriculum emplacement strategy. Lead teachers and the entire school staff participate in an implementation cycle that addresses "big ideas" for all students through active learning and authentic assessment.
- The Mathematics Renaissance, a school-based, comprehensive program that addresses teachers' diverse professional development needs; works with administrators, parents, and community members; and works with schools to transform middle-grades mathematics programs through a long-term commitment by faculty members, who

participate in activities during the academic year and summer months.

- Systemic Connections, a component based on the belief that while CSIN and the Math Renaissance are necessary, they are not sufficient for total systemic reform in California. Systemic Connections brings together diverse groups—business, industry, government, parent groups, administrators, and teachers—for setting common visions, establishing supportive policies, and informing educators and the general public of these measures. This component advocates for mathematical and scientific literacy by establishing the reforms for all students.

Accomplishments

To date, 1,000 schools—20% of the elementary schools in the state— have participated in CSIN: 400 in the planning stage and 600 in the implementation stage. Schools in the implementation phase have focused on physical and earth science. Over the past two years, more than 800 lead teachers, approximately 0.02% of the elementary teachers in the state, attended 18-day institutes and provided 34 hours of on-site professional development to the entire school staff. Over 12,000 teachers, affecting some 360,000 elementary students, have participated in teacher institutes and implementation programs, resulting in an 80% increase in the confidence level of CSIN teachers and a 70% increase in hands-on experience, as some 90% of CSIN teachers taught their assigned science units. CSIN also conducted three institutes in conjunction with the California Science Project, one with Sandia National Labs, and one for retired scientists through a California Post-Secondary Education Commission (CPEC) grant. They have joined with the NSF Southern California Area Modern Physics Institute and the National Science Teachers Association's Scope, Sequence and Coordination programs as well as the Urban Systemic Initiatives and NSF Science In Rural California, to provide training for teachers and services to rural counties.

Currently, over 420 schools, nearly 40% of the state's middle schools, are participating in the Mathematics Renaissance. Over 30% of these schools are in their third year of participation, and 10% are in their fourth. At present, an average of 76% of participating schools' mathematics teachers attend 8 to 12 full days of inservice experiences during the academic year and 1 to 4 weeks during the summer. Participating schools contribute $10,000 to $15,000 annually. The teacher participation rate has increased annually. Each year, participating teachers have replaced portions of their existing mathematics program with state-of-the-art curriculum units that provide concrete models of national standards-driven curricula. The majority of school faculties have begun discussions that will reshape the entire school mathematics program.

CAMS formed a Technical Implementation Committee, bringing together programs in mathematics and science reform, developing common visions, and supporting policies for better mathematics and science for all students. The Committee developed a permanent 20-member Policy Advisory Board, consisting of the upper management of key businesses, educational and governmental agencies, parent groups, and colleges and universities. The Board meets several times each year to review progress and make policy recommendations. Various task forces and focus groups meet as needed. CAMS has collaborated in programs with the business community, including San Onofre Nuclear Generating Station, which lent an engineer to CSIN and helped develop public service announcements for CAMS. CAMS, with the Far West Regional Consortium, sponsored the Getting Our Act Together conference for 250 participants, including suppliers of professional development programs. The SSI developed brochures, parent pamphlets, newsletters, and videos as part of a public relations campaign.

Important Partners and Alliances

State-level leadership supporting the CAMS initiative includes the Office of the Superintendent of Public Instruction and the Governor's Office of Child Development and Education. Support with additional funding has come from CPEC, federal Eisenhower funds, and Chapter 2 of the federal Elementary and Secondary Education Act. CAMS has formed connections with other NSF grantees and the statewide staff development networks, the California Science Project, and the California Mathematics Project. Other alliances include the Regional Consortium for Mathematics and Science, located at Far West Labs; McDonnell Douglas; Lawrence Livermore Lab; Sandia National Lab; Hewlett-Packard; the Noyce Foundation; It's Elementary; and Caught in the Middle.

Colorado

Governor: Roy Romer

Principal Investigators: Fran Berry, James Curry, Henry Heikkinen, Larry Johnson, Nancy Kellogg, Richard Laughlin

Point of Contact: Richard Laughlin, Project Director
CONNECT
1580 Logan Street, Suite 740
Denver, CO 80203
Phone: 303-894-2140
FAX: 303-894-2141
EMail: rlaughli@ssi.edc.org

5-Year Award: $10,000,000

Context

Colorado is the eighth largest state geographically; its population numbers 3,300,000. Of its 680,000 K–12 students, 21% are from minority families. The Rocky Mountains divide the state both geographically and culturally, contributing to a sense of regionalism. Colorado residents tend to prefer having local authority over educational decisions; Colorado has no statewide graduation requirements or textbook controls. Its strong system of higher education has attracted new science-related and technology-related industries to the state.

Vision

Colorado classrooms, schools, colleges and universities, workplaces, and communities ensure that all Colorado citizens possess high levels of mathematical and scientific literacy and that everyone has the mathematical and scientific reasoning and knowledge needed for productive work and citizenship. All citizens, regardless of gender, cultural background, or location, have the opportunity to fully experience the excitement of discovery, the power of problem solving, and the fulfillment of understanding our world.

Strategy

Colorado has numerous educational reform initiatives and networks at local, regional, and state levels that provide a rich context for the implementation of SSI. Two significant state strategies are (1) the recent passage of legislation requiring all school districts to adopt content standards that meet or exceed state model standards and (2) NSF funding of CONNECT, Colorado's SSI. CONNECT, with its 12 Collaborative Partnerships, analyzes policy structure and potential barriers at local, regional, and state levels and recommends the implementation of new policies or revisions that will sustain systemic change in educational instruction. CONNECT's 12 Collaborative Partnerships link the development of high mathematics and science content standards with changes in curricula, assessment, instructional models, teacher preparation, and professional development. CONNECT is providing effective leadership and sustained support at all levels of governance and is engaging the public as advocates of systemic reform. CONNECT combines bottom-up changes in learning environments with supportive and enabling structures at more centralized levels of the system.

Accomplishments

1. ***Organization/Management***
An Advisory Board of Directors has been established, with members appointed by Governor Romer. The board has a broad constituency, including key legislators, presidents of institutions of higher education, K–12 administrators and teachers, and members of the business community. The CONNECT Management Team includes representatives from the Colorado State Department of Education and the governor's office, as well as the commissioner of higher education, scientists, mathematicians, and K–12 educators.

2. ***Local Collaborative Partnerships***
Twelve local Collaborative Partnerships have been formed, each staffed by facilitators from a K–12 school district, an institution of higher education, and local business, government, and community organizations. All partnerships have developed strategic plans and signed a cooperative agreement committing to systemic change.

3. ***Standards Development***
Governor Romer appointed a co-principal investigator and representatives from several Collaborative Partnerships to the nine-member Standards and Assessment Development and Implementation (SADI) Council, which is developing state model content standards in mathematics and science. The director of the state assessment program, a

CONNECT

EVERYONE CAN DO MATH AND SCIENCE

member of the CONNECT Management Team, serves as an exofficio member of the council. Three co-principal investigators cochair the mathematics and science task forces that are working under the direction of the SADI Council. The Collaborative Partnerships work locally on the development and implementation of local content standards that must meet or exceed state model content standards.

4. *Policy Structure*
The CONNECT project director (the deputy commissioner of education) cochairs a legislative committee task force that is linking K–12 content standards and higher education admissions requirements. The State Board of Education, whose chair serves on the CONNECT Advisory Board of Directors, will receive recommendations from the SADI Council on the state model content standards, a student assessment program aligned with the standards, and a standards implementation plan, including professional development. Co-principal investigators serve on the task forces for standards development, assessment, and professional development.

5. *Technology*
A Technology Advisory Committee has been established, with members from K–12, higher education, and business. A network donated by the University of Colorado at Boulder connects the 12 Collaborative Partnerships. Members of the CONNECT Management Team have received training in electronic networking, including email, Mosaic, and World Wide Web.

6. *Scale-Up*
Participating with U.S. West and the University of Northern Colorado (UNC), CONNECT provides electronic networking access to the Mathematics and Science Teaching (MAST) hotline for three to eight mathematics and science teachers in each of the 12 Collaborative Partnerships and two to three teachers in 112 additional school districts in Colorado. UNC provided technology training and U.S. West provided laptop computers and software to the teachers. Teachers in the remaining 52 Colorado school districts have access to the hotline via telephones. CONNECT financially supported training in standards-based education for teams of up to 10 members from each Collaborative Partnership and for three teachers in each of the 112 school districts.

7. *Equity*
A co-principal investigator (a state EQUALS and Family Math trainer) serves on the state Education Equity Network, which links the K–12 and higher education community with the Office of Civil Rights and federally-funded equity programs. CONNECT has supported Girls Count, a gender-equity initiative, in establishing statewide training in its programs and materials.

Important Partners and Alliances

CONNECT works collaboratively with the following organizations and agencies: the Colorado Commission on Higher Education; institutions of higher education; the American Association of University Women; Girls Count; U.S. West; AT&T; the Mid-Continent Regional Educational Laboratory and High Plains Consortium; the Colorado Teacher and Administrator Licensure Board; Mathematics, Engineering, and Science Achievement; the American Indian Science and Engineering Society; the PTA; the Colorado Alliance for Science; the Colorado Mathematics Coalition; and the Colorado affiliates of the Council of Teachers of Mathematics, the Association of Science Teachers, the Association of School Administrators, the Association of Black Professional Engineers and Scientists, the Education Association, and the Association of School Boards.

Blackstock Elementary School students in the Gunnison Watershed RE1J School District in Gunnison, Colorado learn how to use the Global Positioning Satellite System.

Connecticut

Governor: John Roland

Principal Investigators: Gérman Bermúdez, Steve Leinwand, Mari Muri, Steve Weinberg

Point of Contact: Richard Cole, Executive Director
Connecticut Academy for Education in Mathematics, Science and Technology, Inc.
178 Cross Street
Middletown, CT 06457
Phone: 203-346-1177
FAX: 203-346-2157
EMail: rcole@ssi.edc.org

5-Year Award: $8,653,397

Context

Connecticut ranks first in per capita income, per capita citizen education level, and teacher salaries. Yet despite these advantages, its three largest cities rank among the 20 cities in the nation with the highest poverty rates. The state's 167 school districts educate approximately 509,000 public school students, 74% of whom are Caucasian; however, 19 school districts educate nearly 78% of the state's minority students. While communities fund 59% of local education costs and are strongly independent, the state leads the country in many important educational enhancement issues.

Vision

Connecticut's vision is to work with local school districts, the State Department of Education, and others to implement the long-term institutional changes necessary to raise the quality and quantity of students' engagement with mathematics, science, and technology to ensure that students (1) take courses that are useful in the technical workplace, are preparatory for higher education, and contribute to their intellectual development and (2) increase their level of mastery of the courses in which they enroll.

Strategy

The strategy of the Connecticut SSI, CONNSTRUCT, incorporates three reciprocal activities: (1) providing the state's most needy school districts with technical, financial, and community support to implement locally developed, long-term improvement plans for mathematics and science teaching and learning based on established and proposed national standards; (2) working with colleges and universities to increase the effectiveness of their teacher preparation and professional development programs; and (3) heightening public awareness of the need for all citizens to master mathematics and science and to support efforts to help children achieve mastery and schools achieve excellence.

Accomplishments

1. ***The Connecticut Academy for Education in Mathematics, Science, and Technology***

The Academy administers Project CONNSTRUCT with the State Department of Education and serves as the focal point for systemic change in the state. The Academy has been designated by the state legislature as an advocate for high-quality teaching and learning, educational equity, access, and high academic standards, and has played a critical role in raising an additional $10,000,000 for CONNSTRUCT. The Academy is a key player in establishing statewide collaboratives, including the Statewide Professional Development Resource Network, Eisenhower-supported higher education programs, the Regional Alliance Statewide Action Team, the CT SSInet computer network, Family Math and Family Science teachers, the Joint Committee on Educational Technology, and the Connecticut Center for Educational Technology and Training. It assists 19 school districts in implementing their long-term mathematics/science/technology improvement plans, and it develops discipline frameworks and enhances teacher assessment, professional development, and certification programs.

2. ***Local School Districts***

Sixty districts currently engage in reform efforts that include identifying, defining, and revising curricula; promoting structured professional enrichment programs; and developing assessment tools based on existing and proposed national teaching and learning standards. They educate the state's neediest students and enroll 32% of the total student population, surpassing the five-year target of reaching 20% of schoolchildren. These districts serve 72% of the

state's African American and 78% of its Hispanic children. Quantitative and qualitative benchmarks that include data from teacher and student surveys, from Council of Chief State School Officers national surveys, and from State Department of Education mathematics mastery tests have been completed for all districts.

In high schools, 96% of African American, 89% of Hispanic, and 94% of Caucasian students are taking some course in mathematics; and 84% of Caucasian students, 81% of African American, 73% of Hispanic are enrolled in science courses. In middle schools, 98% of Caucasian students are enrolled in either mathematics or science, 92% of African Americans are enrolled in mathematics and 87% in science, and 88% of Hispanics are enrolled in mathematics and 80% in science. Year 4 activities will focus on decreasing the disparity between white and minority enrollments.

3. ***Institutions of Higher Education***
CONNSTRUCT has supported 54 grants to 11 institutions of higher education (IHEs), affecting 500 participants. It is working to strengthen the preparation of preservice certification programs at 11 of the 14 IHEs that graduate over 90% of the state's new teachers each year, with restructuring of preservice certification programs begun at five IHEs. CONNSTRUCT has sponsored 13 dialogues in the sciences and education among IHE faculty and administration, teachers, business representatives, and mathematicians and scientists at eight IHEs leading to 21 coteaching collaboratives between K–12 teachers and IHE faculty.

4. ***Community and Science-Rich Institution Partnerships***
CONNSTRUCT has involved over 30 organizations in 236 schools, affecting 1,050 teachers, 7,000 students, and 650 families in 20 communities. Family Math and Family Science teacher training has occurred in all 19 CONNSTRUCT districts, with an annual statewide Family Math/Science teachers' collaboration. Over 30 Connecticut companies have participated in CONNSTRUCT activities, and nine organizations have received $10,000,000 in additional funding.

5. ***Public Awareness Program***
CONNSTRUCT maintains "equity partnerships" with four commercial TV stations, one public broadcasting network, and two state newspapers. This SSI has two major media campaigns—"Learning Doesn't Take a Vacation" and "Excellence within Reach"—targeting parents and other interested adults. Ads have run on television and radio stations and in English and Spanish newspapers. After distributing 300,000 copies of Family Math/Science inserts, the Academy received 1,200 calls for reprints and more information. CONNSTRUCT also runs a Fellows Program which includes 66 outstanding citizens, educators, business leaders, and political leaders engaged in various policy, planning, and outreach efforts. A public outreach program identifies the needs, barriers, and solutions to higher standards for all children in mathematics/ science/ technology.

Important Partners and Alliances

Project CONNSTRUCT partners include the state departments of education, higher education, and economic development; the governor's office; the state legislature's Education Committee; IHEs; science-rich institutions; business, community, and media organizations; local school districts, school boards, and parent groups; and educational associations.

Parents, teachers, and children working together on a Family Math/Science Activity.

Delaware

Governor: Thomas R. Carper

Principal Investigator: Paul LeMahieu

Point of Contact: Helen Foss, Project Director
Delaware Department
of Public Instruction
Building 570
Delaware State University
Dover, DE 19901
Phone: 302-739-2913
FAX: 302-739-2916
EMail: hfoss@ssi.edc.org

5-Year Award: $5,436,190

Context

Delaware is the second smallest state and ranks 46th in population. African Americans constitute one-sixth of the residents. Manufacturing remains important in Delaware's economy, though financial and other services are playing increasingly prominent roles. The majority of the population lives in the suburbs; the state's largest urban area is Wilmington. At slightly more than 100,000, Delaware's public school population is one of the smallest in the nation, making education reform efforts more manageable.

Vision

The SSI effort, Project 21, is one of several components of the Department of Public Instruction's "New Directions for Education in Delaware." Project 21 seeks to (1) effect fundamental, widespread change in the teaching and learning of mathematics and science; (2) craft illustrations of mathematics and science content standards to offer a vision of effective teaching, learning, and assessment strategies that would help drive valued student performance; and (3) build a school and community culture that supports rigorous teaching and learning in mathematics and science for all children.

Strategy

The Project 21 strategy consists of developing exemplars, building capacity, expanding awareness, and influencing policy. The first of these elements revolves around using a school-based team structure—called Development Partners—composed of site teachers, building administrators, and district support professionals, to promote school reform. Making use of collaborative inquiry, Development Partners draft or adapt, pilot, evaluate, and refine instances of best practices that embody the outcome standards developed for the state. They are given access to the best curricula available and are supported by Project 21 to ensure collaboration among stakeholders. This development work, taken in conjunction with the reflective capacities engendered by the collaborative inquiry, forms the foundation of professional development capacity-building among the partners. These partners also serve as demonstration sites and focal points for disseminating ideas.

Accomplishments

1. ***Establishing Development Partnerships***
To date, Project 21 has

- supported collaborative teams of approximately 250 practitioners from 25 New Directions Development Site (NDDS) schools (out of the state's total of 175 schools) in 15 of the 19 school districts;
- provided capacity-building experiences for NDDS teams, including two-week Professional Development Institutes and four statewide meetings during the school year;
- provided on-site classroom coaching and team facilitation around needs for instructional and school change;
- crafted and implemented an equity plan to help sites begin to explore ways to meet the needs of all their students, with special emphasis on the introduction of Complex Instruction strategies; and
- observed changes in school structures, operating procedures, and classroom practices within a significant portion of NDDS schools.

2. ***Building Illustrations***
Project 21 has

- developed, piloted, and refined the first published illustration of a Delaware content standard;

- supported development work with NDDS teams, producing abstracts of 35 exemplars as draft illustrations of the new standards;
- engaged in collaborative efforts with several outside agencies (e.g., the Delaware Department of Natural Resources and Environmental Control) to support teachers in the development of standards-based learning units; and
- created the development model for mathematics and science being used to support the development of illustrations in other content areas.

3. ***Supporting Commissions***
Project 21 has contributed to the writing and review of the Mathematics and Science Curriculum Framework Commission's draft content standards now circulating for professional and public review and comment; the SSI has also supported the development, pilot testing, and refinement of illustrations for the commission's framework documents.

4. ***Connecting Stakeholders***
Project 21 has

- launched a regular newsletter, the *Standard Bearer,* to keep SSI partners and stakeholders informed of activities and progress;
- launched a mathematics and a science collaborators' forum to strengthen ties and communication among leaders of all mathematics and science reform initiatives throughout the state;
- convened periodic meetings of principals of NDDS and Re:Learning schools to address the needs of school leadership for reform;
- responded to the Science Alliance and Quest groups (both state-level business and education partnerships) for assistance in aligning their efforts with New Directions and the SSI;
- supported Junior Achievement's Mentor/Tutoring Program by creating a model for business and higher education to work with traditionally underserved and underachieving students in mathematics and science; and
- built a partnership with state-level Chapter 1 leadership to engage a team of Chapter 1 and regular teachers in learning Complex Instruction strategies—a cornerstone in the SSI equity operational plan.

Important Partners and Alliances

Project 21 has established relationships with the following: the University of Delaware Education Research and Development Center, the Delaware State University Center for School Change, the Department of Public Instruction, the Mathematics and Science Curriculum Framework Commission, the Science Alliance, the Mathematics Coalition, Junior Achievement, Re:Learning Schools, E.I. DuPont DeNemours, Inc., the Delaware Department of Natural Resources and Environmental Control, the University of Delaware Mathematics and Science Teaching and Learning Center, the University of Delaware College of Education, and the Delaware State University School of Education.

Florida

Governor: Lawton Chiles

Principal Investigators: Lee Bailey, Thomas Baird, Marianne B. Barnes, Walter J. McCarroll

Point of Contact: Thomas Baird, Project Director, SSI
Florida Department of Education
344 Florida Education Center
Tallahassee, FL 32399-0400
Phone: 904-922-4207
FAX: 904-922-0028
EMail: tbaird@ssi.edc.org

5-Year Award: $7,913,882

Context

Florida is experiencing unprecedented growth, with a projected doubling of the population between 1972 and the year 2000, making Florida the fourth most populated state. Nearly 27% of the population is minority, almost equally divided between Hispanic and African American. Each year, the state absorbs approximately 60,000 new students into the educational system, with a K–12 classroom teacher attrition rate of nearly 6%. Tourism plays a significant role in Florida's economy, as do the high-tech space and defense industries in certain regions of the state. By the year 2000, 83% of new entrants into the work force will be women, minorities, and immigrants—groups traditionally underrepresented in scientific and technical fields.

Vision

Florida's SSI vision celebrates diversity and focuses on empowering individuals to pursue and support lifelong science, mathematics, and technology learning.

Strategy

The SSI approach to meeting the challenge of Florida's growing and diverse population is to build sound foundations for systemic change in each of Florida's 67 school districts. Florida has begun by building capacity in 27 demographically representative and strategically located districts, through the establishment of a statewide network of 35 model schools. Florida's SSI is strengthening partnerships between these SSI schools and their respective districts to improve teaching and learning of science and mathematics districtwide. A goal of this effort is the establishment of a system of professional development. A second goal is for science and mathematics to be present in each school's School Improvement Plan. Technical assistance is provided by six SSI regional coordinators. State-level efforts focus on coordinating long-range instructional goals, professional development, and assessment; improving teacher preparation programs; focusing efforts to address issues of equity and access to quality science and mathematics instruction; strengthening the role of the Higher Education Consortium to recruit females and minorities to science and mathematics education; developing vehicles for public awareness; and coordinating efforts with Urban Systemic Initiatives (USIs), Rural Systemic Initiatives (RSIs), curriculum frameworks, School Improvement Teams, Environmental Education Regional Service Projects, and Centers for Excellence in Mathematics, Science, and Technology.

Accomplishments

1. *Local-Level Accomplishments*

The Florida SSI has provided intensive professional development to 35 model school faculty teams; each includes an administrator, primary and intermediate teachers, and a district support person. More than 200 hours of formal, individual staff development time have been invested in these teams, through activities that include three summer academies, six to eight Saturday Seminars, a New Schools Orientation Conference, two statewide spring symposia, distance learning training, and state and national conferences, including attendance by most teams at the National Science Teachers Association regional conference in Orlando in December 1993.

An analysis of Local Model School Progress Reports submitted in the spring of 1993 indicates that 68% of schools report improved teacher attitudes and confidence in teaching science; 80% report that teachers are experimenting with new teaching methods and are placing more emphasis on science; 64% acquired more equipment, materials, science books, and software; and 96% report increased community and parent involvement. Moreover, all of the school teams have involved teachers other than the

DISCOVER
SCIENCE AND MATHEMATICS IN FLORIDA

50 that were recruited and trained in the fall of the first year, with a total of 316 teachers involved by the first spring.

2. *Regional-Level Accomplishments*
Florida's SSI has formed a collaborative network of technical assistance providers, consisting of School Improvement Team leaders, Centers for Excellence directors, and Environmental Education Regional Service project directors. Each Regional Work Plan is funded by the SSI and implemented by coordinators, with oversight provided by Regional Advisory Councils. Some 27,000 contact hours of inservice activities and technical assistance have been provided within the last year through regional activities, and more workshops are planned to scale up the initiative.

3. *State-Level Accomplishments*
"Blueprint 2000," Florida's statewide plan for school improvement and education accountability, provides high standards of student performance and decentralizes the system of public education to enable districts and schools to design learning environments and activities that meet each child's needs. An active participant in the Florida Department of Education's school improvement efforts, the SSI draws on a number of resources to develop a coherent strategy in each district to support science and mathematics reform. The SSI coordinates state-level policies and programs, including long-range instructional goals; teacher preparation and professional development; certification; and assessment. Efforts are spreading throughout the state, with one-third more districts brought in this year; strong coordination is established with the Miami and Jacksonville USIs. The Florida Department of Education funded a statewide summit and teleconference on Math, Science, and Technology to create bridges between key stakeholders. The Florida Higher Education Consortium (HEC) includes 130 faculty representatives from 19 universities and 14 community colleges, conceiving a new vision for teacher preparation; a Framework for Teacher Preparation was drafted for fall 1994. *Science for All Students*, a curriculum framework, is complete and being implemented in all SSI districts and most other districts. Statewide training in alternative assessment strategies has been provided and kits have been purchased for use by local districts; about one-third of schools participated in a nationwide field test of State Collaborative on Assessment and Student Standards performance assessments from the Council of Chief State Schools Officers. Florida's public awareness campaign continues to publish a quarterly newsletter, *Discover News*, with a statewide distribution of 100,000 copies. Now in development are "Parent Activity" inserts for Florida newspapers, brochures, a *Discovery Guide*, posters, a *Model School Profiles* booklet, and public service announcements. Production of a video will begin in the spring of 1995 with help from the National Governors' Association and the Urban League.

Important Partners and Alliances

Through a partnership with the American Association for the Advancement of Science (AAAS), Florida's SSI is coordinating a grant to develop a unified strategy to address issues of equity and access in science and mathematics education. The grant, Science Education Reform for All (SERA), will involve state science and mathematics supervisors, Chapter 1 coordinators, bilingual coordinators, exceptional education coordinators, and coordinators from the SSI and USIs. Florida is one of three states piloting this partnership.

Strong partnerships with the Florida Department of Education and the Florida Science Framework Project provide Florida's SSI with a unique opportunity to serve as a catalyst in coordinating long-range instructional goals, materials development and adoption, teacher preparation and professional development, certification, and assessment in the areas of science and mathematics.

Students in a Discover school participate in a hands-on investigation.

Georgia

Governor: Zell Miller

Principal Investigator: Michael Padilla

Point of Contact: Michael Padilla
Georgia Initiative in Mathematics and Science
G-9 Aderhold Hall
Athens, GA 30602-7126
Phone: 706-542-4341
FAX: 706-542-4348
EMail: mpadilla@uga.cc.uga.edu

5-Year Award: $10,000,000

Context

The largest state east of the Mississippi River, Georgia has a population of approximately 6,623,000, 27% of whom are African American. Both educational attainment levels and jobs have shown significant gains. Since 1940, educational attainment has increased dramatically: in 1940, only 17.2% of the adult population had a high school education, whereas in 1990, 70.9% had completed high school—a 54% increase over a 50-year period. Georgia also experienced a 28% increase in jobs during the 1980s, particularly in and around Atlanta.

Vision

The Georgia Initiative in Mathematics and Science (GIMS) aims to create a stimulating climate in which all students will use their minds well, take responsibility for their lives, and contribute positively to the global community. To achieve these ends, students must become scientifically and mathematically literate and must construct meaningful and useful understandings of mathematics and science. Students will thereby become creative problem solvers, critical thinkers, questioners, experimenters, innovators, effective communicators, and reflective learners.

Strategy

GIMS is initially targeting grades 4–8 in four major goal areas: (1) diversity, (2) teacher development and recruitment, (3) curriculum/instruction/assessment, and (4) partnerships for system change. Nevertheless, several aspects of GIMS span K–12. At five regional centers, where college-level institutions are affiliated with public schools (called Professional Development Schools), GIMS is developing processes, projects, and strategies that focus on diverse learners, a framework for learning, instructional support tools, professional development of principles and practices, and community/business partnerships. The centers serve as the foci for innovation and are networking with schools, organizations, and agencies throughout the state to offer learning opportunities based on the practices developed there.

Accomplishments

1. ***Diversity***

The Conceptual Framework for Diversity outlines the beliefs and principles of GIMS that relate to teaching, learning, and the environment which promotes equity and excellence. It builds on the rich diversity of individuals in Georgia and serves as a framework on which GIMS' processes, programs, and activities are based. A preservice education program has been designed and implemented for minority teachers of science and mathematics. In addition, a gender-equity program involving five institutions of higher education and six major school systems has been established; a program for the recruitment of minorities as future teachers of mathematics and science has been implemented; diversity principles have been instituted as part of the Principles of Educating Teachers (POET) initiative; and the Southeastern Consortium for Minorities in Engineering (SECME) has been expanded in order to reach 57% of the minority student population in the state.

2. ***Teacher Development and Recruitment***

POET is the fundamental vehicle serving as a core set of principles that establish guidelines on which programs leading to middle school certification are based. POET was developed collaboratively through the participation of faculty from Georgia colleges that educate teachers. The Georgia Industrial Fellowship Program (GIFT) has been implemented for teachers to work in science-related business and industry; to date, over 130 teachers have participated. A program was established for the early identification, recruitment, and retention of minorities to

teach science and mathematics and is currently operating at one university, with plans to implement the program in others. In process are the development of a beginning teachers' mentor program, the expansion of a mathematics reflective teaching model to science, and the implementation of the Program for Administrator Support of Science and Mathematics.

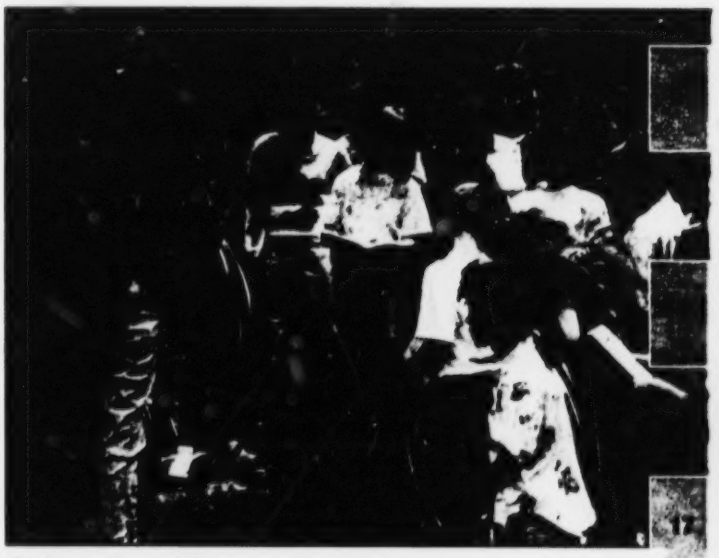
2. *Curriculum/Instruction/Assessment*
The draft of the *Learning Framework in Mathematics and Science* was completed and serves as the principal document that ties together all efforts related to curricula, instruction, and assessment. Implementation of the Framework includes exemplary staff development, sample assessment and classroom activities, and the use of video technology. A planning model of interdisciplinary teaching was designed and field-tested and is being implemented. Community Based Instructional Resources, which establish partnerships with science- rich and mathematics-rich community resources, are being developed and implemented throughout the state. Under development is a teacher education program for creating high-interest science activities based on sporting events.

4. *Partnerships for System Change*
The Georgia Coalition for Science, Technology, and Mathematics Education was established as an advocacy partnership of business, legislators, educators, scientists, and mathematicians. Ongoing partnerships are described below.

Important Partners and Alliances

The most important partnerships are between and among individuals—teachers, scientists, mathematicians, business/industry, college educators, parents—working to develop a common vision that every child can be successful in mathematics and science.
A partner in policy/governance is the Georgia Partnership for Excellence in Education.
The Georgia Department of Education has partnered with GIMS on the *Learning Framework* and alternative assessment initiatives. Regional centers are partnerships between public schools and colleges and universities. Community partnerships exist among the 16 Regional Education Service Agencies. Communications or marketing alliances include the Georgia Partnership for Excellence in Education, CNN, and the Georgia Public Television Network.

Partnerships with professional organizations include the Georgia chapters of the National Science Teachers Association, the National Council of Teachers of Mathematics, the Supervisors of Mathematics Association, the Science Supervisors Association, the Middle School Teachers Association, and the Association for Supervision and Curriculum Development. Among the business/industry linkages are poultry/agribusiness, the kaolin industry and China Clay Producers, Georgia Power Company, and Southern Bell.



Student outdoor activity.

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Kentucky

Governor: Brereton C. Jones

Principal Investigators: Thomas Boysen, Lee Todd, Jr.

Point of Contact: Michael N. Howard,
Project Director
Kentucky Science and
Technology Council, Inc.
P.O. Box 1049
Lexington, KY 40588-1049
Phone: 606-233-3502
FAX: 606-259-0986
EMail: mhoward@ssi.edc.org

5-Year Award: $9,672,300

Context

Demographically, Kentucky's population of 3,713,000 is relatively balanced between rural and urban areas. The state's economy has become increasingly industrial over the years with manufacturing moving to the forefront of its financial picture. Kentucky's schools serve approximately 10% minority students, but only 2.2% of the mathematics and science teachers in grades 9–12 are non-Caucasian. In 1990, the Kentucky General Assembly passed the Kentucky Education Reform Act (KERA), a comprehensive, statewide reform initiative.

Vision

The Partnership for Reform Initiatives in Science and Mathematics (PRISM) ensures that all Kentucky students have the knowledge, understanding, and skills to participate in a technology-based 21st century. Through this endeavor, increases will occur in literacy, educational participation—especially among minorities, women, and economically disadvantaged persons—and the public's valuing of education.

Strategy

To further educational reform in mathematics and science, a close partnership was fostered between the Kentucky Department of Education; the Kentucky Science and Technology Council, Inc.; and NSF. PRISM, the resulting project, focuses on four areas: (1) developing and implementing a plan that influences the state's general reform effort, particularly relating to underrepresented groups, as it affects science and mathematics education; (2) developing a statewide network of teacher specialists and support staff to provide ongoing local and regional training and technical support; (3) assisting colleges and universities in redesigning mathematics and science courses, especially those for preservice teachers; and (4) establishing policies and strategies to increase the public awareness necessary to sustain the reform effort.

Accomplishments

1. ***Model Change Sites***
Nineteen schools have been established as model change sites, sharing resources as they transform their mathematics and science programs.

2. ***Statewide Network of Teacher Specialists***
To date, specialists have provided professional development and served as a support network throughout the state. One hundred fifty-two primary teachers and 168 fourth- and fifth-grade teachers have been trained as science resource specialists; 64 teachers as instructional technology resource specialists; and 60 teachers in grades 5–8 as mathematics resource specialists in two regions of the state, piloting the training for statewide implementation in Year 3. In addition, over 300 teachers have been trained to use the statewide electronic bulletin board and SSI discussion centers. By the end of the second year, specialists or model sites were in three-fourths of the counties in the state.

3. ***Curriculum, Assessment, and Instruction***
Forty primary science instructional units have been developed, field-tested, and distributed to teachers across the state, and 10 mathematics and science units integrating technology and instruction have been developed. All 50 units were aligned with academic expectations, the curriculum framework, and state performance assessment guidelines. Over 200 elementary teachers have been trained to use a portfolio assessment task design manual; this training included the incorporation of assistive and adaptive technologies into the design of performance assessment activities for students with disabilities. Further, a comprehensive examination process for schools, called SMARTQM, has been piloted and implemented.

PRISM

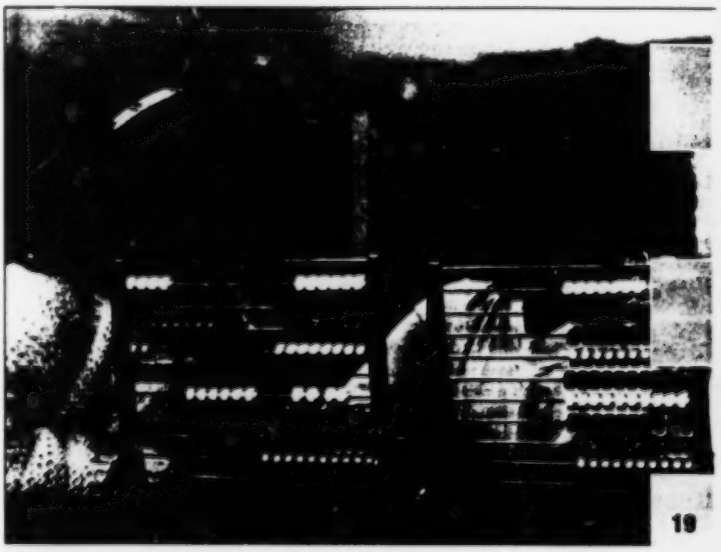
4. ***Higher Education***
Ten faculty members at public and private colleges and universities have developed models for undergraduate mathematics and science courses. Conclaves involving 250 college and university faculty were held to improve methods for teaching undergraduate mathematics and science, including symposia on teaching calculus and chemistry and on collaborative learning strategies for community college mathematics faculty. Task forces of science and mathematics teachers and university faculty have developed a set of performance tasks to be used for teacher certification.

5. ***Communications***
Three hundred teachers, government officials, and business leaders attended a statewide conference on the role of science and technology in education and work. A booklet for parents addressing the importance of mathematics and science education has been printed and 120,000 copies distributed. As part of a long-term public awareness campaign, an initial set of five public service announcements was produced and has been distributed to over 170 newspapers, television stations, and radio stations across the state.

6. ***Statewide Equity Issues***
PRISM has developed a strategic plan for addressing statewide equity issues. Special efforts have been made to recruit African Americans and teachers working with a high percentage of minority or low-income students to the specialist initiatives. Teachers working with at-risk and minority students at 19 secondary schools have been trained in mathematics teaching in partnership with the statewide Advancement Via Individual Determination Program.

Important Partners and Alliances

To initiate and sustain this type of systemic change, many individuals and organizations have lent their cooperation: the governor; the Kentucky General Assembly; the commissioner of education; the Kentucky Department of Education; the Kentucky Council on Higher Education; the state's colleges and universities; the State Board for Elementary and Secondary Education; the Kentucky Science and Technology Council, Inc.; the Prichard Committee for Academic Excellence; the Partnership for Kentucky School Reform; the Kentucky Council of Teachers of Mathematics; the Kentucky Science Teachers Association; the Kentucky Academy of Science; the Kentucky Mathematics Coalition; Kentucky Educational Television; and science and mathematics teachers, teacher educators, academic scientists and mathematicians, school administrators, local school boards, regional educational cooperatives, business and community leaders, parent organizations, the general public, newspapers, radio stations and television stations.



Students from a Jefferson County area school

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Louisiana

Governor: Edwin W. Edwards

Principal Investigator: Kerry Davidson

Point of Contact: Kerry Davidson, Project Director
Louisiana Systemic Initiative
1885 Wooddale Blvd., 11th Floor
Baton Rouge, LA 70806
Phone: 504-342-4253 or
504-922-0690
FAX: 504-342-6926 or
504-922-0688
EMail: kdavidso@ssi.edc.org

5-Year Award: $10,000,000

Context

Education, a politically charged issue in Louisiana, is near the top of the state's agenda. Prior to the 1980s, well-paying jobs that did not require high levels of education were available in the oil industry. The state has one of the highest rates of illiteracy, one of the lowest rates of high school graduation, one of the highest rates of teenage pregnancy, and one of the lowest rates of performance on the American College Testing (ACT) assessment. With the decline in oil prices and the reduction in manual jobs in the petrochemical sector, the poorly educated are not faring well. Attitudes toward education are changing as people come to understand that a well-trained work force is the key to attracting and maintaining new industry in a state that a few years ago had the nation's highest rate of unemployment. In fact, the spirit of educational reform began before the SSI project. A 1986 constitutional amendment dedicated all proceeds from a sizable oil settlement with the federal government to education—the Louisiana Education Quality Support Fund (LEQSF). The Board of Regents (BoR) and the Board of Elementary and Secondary Education (BESE) committed $10,000,000 of these monies to the Louisiana Systemic Initiatives Program (LaSIP) over its five funded years.

Vision

The initial thrust of LaSIP was standards-based classroom reform of grades 4–8 mathematics and science; the program is currently broadening its range and scope to include K–3 and 9–12. Consistent with evolving national standards, LaSIP recognizes that long-term reform involves substantial change of the school and higher education culture, moving toward critical thinking and problem solving and away from rote learning and memorization. Concerns for racial and gender equity permeate all programs. There is also a growing appreciation of the need for broad-based community support in order to leverage and sustain the reform that has begun. LaSIP is actively seeking to augment original SSI funds to provide the resources and support needed for meaningful and long-lasting reform in mathematics and science education.

Strategy

The heart of LaSIP is professional development, focusing on the redesign of professional development programs for mathematics and science teachers in light of the pervasive changes required to prepare students for productive life in the 21st century. The goal is to develop a culture for lifelong learning and receptivity to change.

A typical LaSIP project provides 150 to 200 hours of contact per participant over a full year. The LaSIP professional development model has three components: (1) intensive, content-rich, classroom-focused summer work; (2) carefully organized academic-year follow-up; and (3) a site coordinator with extensive classroom experience to bridge the gap between university faculty and participants. Local sites annually compete statewide for funding by LaSIP, thereby ensuring continued evaluation and quality control.

Accomplishments

- ***Professional Development***

Seventy-four mathematics and science projects, involving over 2,400 teachers around the state, have been funded by LaSIP in the first three cycles, with an estimated 25 additional projects expected to be funded in 1995–96, affecting 800 more teachers. In 1995–96, an estimated 200,000 students in Louisiana will be taught by LaSIP teachers. Almost 18% of the 59,397 students who took the 1994 seventh-grade mathematics test were students of LaSIP teachers. On an 82-item test, the LaSIP students,

Statewide Reform of Mathematics & Science Education

LaSIP

Louisiana Systemic Initiatives Program

ethnically and economically representative, averaged scores two to three items higher than those of the total population, with a three-point differential at the 25th and 50th percentiles.

2. *Teacher Preparation*
The Louisiana Collaborative for Excellence in the Preparation of Teachers (LaCEPT) was one of the first collaboratives for excellence in teacher preparation funded by NSF in 1993. In January 1994, eight Campus Renewal Projects were funded under LaCEPT, resulting in the development and piloting of experimental courses involving innovative curricula and methodology.

3. *Framework Development*
Collaborating with LaSIP, the Louisiana Department of Education (LDE) received a three-year grant from the U.S. Department of Education for the development of mathematics and science curricular and assessment frameworks. During 1994–95, 10 teachers at each grade level, K–8, will field-test the revised mathematics framework and grade-level activities. Approximately 1,000 teachers have reviewed drafts of the frameworks. The state assessment program is currently being revised by the LDE to align with the framework.

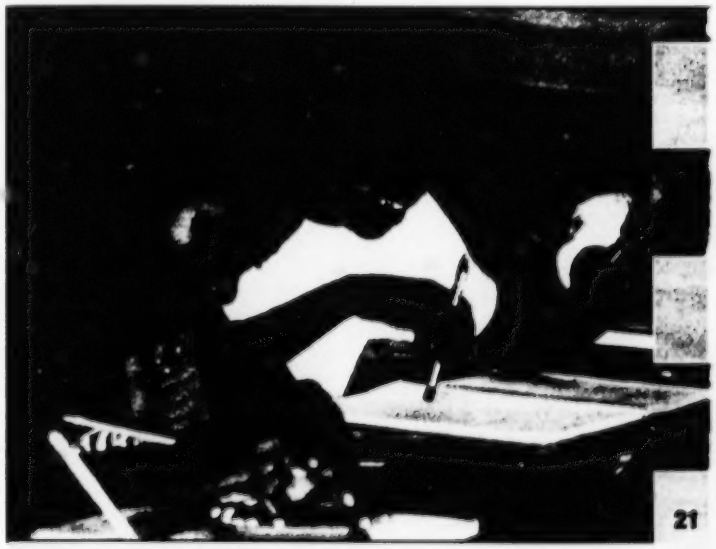
4. *Statewide Assessment*
The LDE is currently planning a move toward revision of the Louisiana Educational Assessment Program (LEAP). "Transition LEAP" will shift from the traditional multiple-choice format to one that incorporates alternative assessment approaches. A statewide group of mathematics educators has worked with the LDE to eliminate some items in the current mathematics item bank and test blueprint that are not aligned with the revised framework. With joint funding from LaSIP, the LDE will pilot alternative items at grades 5 and 7 during spring 1995.

5. *Educational Technology and Networking*
The Louisiana Networking Infrastructure for Education (LaNIE) has been selected for funding by NSF. Its Advisory Council will develop the joint K–14 technology plan for Goals 2000, the BESE, Louisiana Public Broadcasting, and LaSIP. Using a broad base of K–14 educators, three pilot sites will develop systemic models that integrate Internet resources with standards-based instruction.

6. *Developing Partnerships on a Regional Basis*
By the end of 1995, LaSIP professional development projects will have generated approximately $1,500,000 in add-on support from universities, school systems, and the private sector. LaSIP funded Regional Partnership initiatives in six areas of the state to encourage the integration of funds from NSF, Title II, Chapter 2 of the Elementary and Secondary Education Act, and the federal Eisenhower program in promoting the local attainment of national standards in mathematics and science education.

Important Partners and Alliances

LaSIP is being increasingly recognized in Louisiana as a highly effective agent of reform. The Louisiana Goals 2000 Commission is now utilizing LaSIP's models and advice in planning the extension of reform initiatives to other disciplines. The success that has been realized through the collaboration of diverse constituencies and stakeholders has emerged as a source of pride for the state. Among our important partners are: Louisiana Board of Regents and Board of Elementary and Secondary Education; Louisiana Public Broadcasting; Louisiana Association of Partners in Education; Louisiana Department of Culture, Recreation, and Tourism Division of State Libraries; Louisiana Learn and Serve; Louisiana Association of Museums; Louisiana Volunteer Center Directors; Southwest Educational Development Laboratory, and the Urban League of Greater New Orleans.



LaSIP students enjoying a classroom activity.

Maine

Governor: Angus King

Principal Investigators: Dagmar Cronn, Rol Fessenden, Thomas Keller, Jacqueline Mitchell, William Richards

Point of Contact: Thomas B. Clark, Project Director
Maine Mathematics and
Science Alliance
Augusta, ME 04332-5359
Phone: 207-287-5881
FAX: 207-287-5885
EMail: tclark@ssi.edc.org

5-Year Award: $10,000,000

Context

Maine has a population of 1,200,000 of which 60% live in rural areas. While its economy is based on its natural resources, including timber and shellfish, Maine is experiencing a rapid growth in financial services and sales. Although geographically and socioeconomically heterogeneous, Maine is not ethnically or racially diverse; 2% of its population is non-Caucasian or of Hispanic origin. The public school population is 213,000. Maine's SSI program faces such challenges as a child poverty rate of 25%, a 1989 dropout rate of 23%, and a proud tradition of independence and local control.

Vision

Maine sees all its citizens as lifelong learners. All mature members of society share an interest in perpetuating and improving the community that nurtured them as children. Thus, the Maine SSI envisions people working together. Teachers, parents, and other community figures provide models of lifelong learning to children, with parents and teachers coordinating opportunities for children's learning. Schools are laboratories for learning and exploration and are structured to reflect the real world. Professionals join with local educators and public figures to achieve common goals for education. Expectations for every child's success are high. Parents maintain commitment to their own values and those of the community, with a concern for global issues and responsibilities.

Strategy

Maintaining a community focus and working through a nonprofit organization, the Maine Mathematics and Science Alliance (MMSA) embodies these elements: (1) revision of curricula by teachers and professional mathematicians and scientists; (2) identification and incorporation of resources and processes to meet the specific needs of underserved students; (3) establishment of seven Beacon Centers which serve as models and dissemination centers for all schools in Maine; (4) testing and evaluation of curricula in the Beacon Centers through on-site facilitators who are trained in EQUALS; Family Math and Family Science; classroom observation techniques; and alternative forms of student assessments; (5) revision of teacher preparation programs and degree requirements; (6) involvement of communities in resource allocation, technical employment opportunities, evaluation, and decisionmaking to ensure broad-based, relevant educational programs; (7) periodical reexamination of the SSI to ensure effectiveness; and (8) revision of local and state policies and legislation to provide an engine for change and support for continued innovation. An Executive Board of Directors provides oversight.

Accomplishments

The Maine SSI has gone from being a nonexistent player in Maine's reform arena to becoming the head of its reform efforts, now linked to all other efforts in the state. The MMSA has become an important partner in the development of the state's content standards, as well as in efforts focusing on student assessment. On the issue of equity, the Maine initiative has begun tracking the enrollment of girls in mathematics and science courses, as well as the stage at which this enrollment occurs. Five main areas of accomplishments have been described.

- ***Beacon Centers***

Each Beacon Center has a mathematics and science facilitator to assist with the development and dissemination of instructional materials, methods, and technology developed at the Beacon Sites; the MMSA has provided two trainers to advise the facilitators; community action teams have leveraged $300,000 plus in-kind contributions, in addition to the $800,000 provided by NSF for increasing public

awareness of the project; and the MMSA has produced a biannual newsletter for distribution to every school in Maine.

2. ***Summer Apprenticeship Program***
The SSI has maintained a directory of relevant state businesses and has provided 15 to 25 students and teachers with exposure and access to careers and professionals in mathematics and science.

. ***Science and Mathematics Academies***
A consortium of facilitators, teachers, mathematicians, and scientists planned five year-long institutes to provide 140 K–12 teachers with 90 to 120 hours of instruction in mathematics and science content and practice.

4. ***Higher Education***
Universities and colleges have collaborated to establish a Beacon College, a consortium to reform teacher preparation programs consistent with the Beacon Centers' needs. The Beacon College has provided a laboratory in which to pilot new teacher preparation and certification requirements.

3. ***Business Collaborations***
Maine Public Television has collaborated with the SSI in producing a ten-series science program for prime-time slots. The MMSA serves as a consultant to Maine Public Television, in designing and reviewing these programs.

Important Partners and Alliances

The Executive Board of Directors works closely with the governor's office, the state university, the Maine Department of Education, Community Action Teams, and a number of organizations. The SSI has the following partners: L. L. Bean, Inc.; UNUM; the Bigelow Laboratory for Ocean Sciences; America 2000 Schools; National Semiconductor; the Commission on Scientific Literacy; the Maine Aspirations Foundation; the Maine Coalition for Excellence in Education; the Maine Department of Education; the Maine Development Foundation; the NSF-funded Maine Experimental Program to Stimulate Competitive Research (EPSCoR); the Maine Science and Technology Foundation; Re:Learning Schools; Maine Public Broadcasting; the Center for Educational Services; the Maine State Legislature; and Maine State Board of Education.

Hands-on science education moves outdoors in Maine.

Massachusetts

Governor: William Weld

Principal Investigators: David Driscoll, Ronald Latanision, Michael Silevitch

Point of Contact: Thomas Noonan, Administrator
Massachusetts Department of Education
Office for the Advancement of Mathematics and Science
350 Main Street
Malden, MA 02148-5023
Phone: 617-388-3300
FAX: 617-388-3395
EMail: tnoonan@ssi.edc.org

5-Year Award: $10,000,000

Context

Massachusetts is one of the most densely populated and highly urbanized states in the nation. Almost half of the population lives in the Boston metropolitan area. The labor force includes a high percentage of people with professional, technical, or managerial skills. Of more than 861,000 students enrolled in public schools, 1 in 10 does not speak English. Half of these students are in bilingual programs, and almost 2 in 10 of non-English speaking children are enrolled in special education programs.

Vision

All Massachusetts students have access to the richness of the commonwealth's mathematical, scientific, and technological resources and, through hands-on learning, are able to use mathematics and scientific principles to solve problems in their daily lives.

Strategy

Partnerships Advancing the Learning of Mathematics and Science (PALMS) is promoting quality mathematics and science by (1) creating the first Massachusetts curriculum frameworks in mathematics, science, and technology, with plans to disseminate, implement, and continually refine these documents; (2) providing content standards and recommendations for pedagogy, equity, assessment, and professional development; (3) providing broad access to high-quality curricula that supports the frameworks; (4) providing educators and administrators with extensive professional development opportunities focusing on reflective, inquiry-based teaching, on leadership for change, and on science and mathematics content; (5) reinforcing new standards for teacher certification and recertification; (6) collaborating with higher education and local district partners to improve the way those who teach mathematics and science in grades pre-K–12 are prepared and enabled to grow in their profession. To advance systemic improvement in the teaching and learning of mathematics and science in every Massachusetts district, PALMS is building capacity and resources through partnerships with businesses, museums, parents, adult education centers, governmental agencies, higher education institutions, and regional resource providers. The Massachusetts SSI is developing and implementing a statewide strategy to ensure equal access to quality mathematics and science education for all learners, pre-K–adult, and to eliminate the academic performance gap between underrepresented and mainstream students while raising the level of knowledge and skill for all children. PALMS is establishing a statewide telecommunications network that allows direct access to mathematics, science, and technology to support the learning of mathematics and science in the classroom.

Accomplishments

1. ***PALMS Sites and Leadership Teams for Systemic Change***

There are 62 PALMS sites (school districts) across Massachusetts. These sites have demonstrated a commitment to quality mathematics and science education consistent with the Massachusetts Curriculum Frameworks, the Education Reform Act, and national standards. PALMS sites develop and disseminate mathematics, science, and professional development programs via active partnerships. All PALMS sites are establishing Leadership Teams for Systemic Change, which include administrators, teachers, curriculum specialists, college or university partners, museum partners, adult education partners, business partners, parents, and students. PALMS plans to engage a minimum of 60 new school districts during 1994–95 by funding five Regional Providers.

2. ***Curriculum Frameworks***
PALMS has prepared for release the first draft of curriculum frameworks in mathematics, science, and technology. Following a period of public input and State Board of Education approval, a final version is expected for dissemination in early 1995.

3. ***Professional Development***
PALMS has created a cadre of trained educators that it will build on to introduce quality mathematics and science into the classroom. The frameworks provide a foundation for PALMS professional development activities.

4. ***Equity***
PALMS has revised its initiative goals to clearly identify equity as a main area of focus and has added two equity specialists to the PALMS staff. At present, PALMS is assessing school district needs and demographics to effectively deliver quality mathematics and science programs to traditionally underrepresented students.

Important Partners and Alliances

PALMS is supported by matching state funds, federal Eisenhower funds, and substantial grants from the Noyce Foundation of Palo Alto, California. PALMS also links with other NSF-funded programs within Massachusetts, including the Center for the Enhancement of Science and Mathematics at Northeastern University and the Buzzard's Bay Rim Project. Business partners include Tuskegee Airmen; E.I. Dupont DeNemours Inc.; Monsanto; Polaroid; BayBank; Dolphin Resource Group; the Alliance for Education; Texas Instruments; Crane & Company; Warner Cable; Benthos; Onset Computer; Augat, Inc.; The Foxboro Company; Gurney Engineering; and Natick Labs.

Middle School students team up with teachers at the 1994 Summer Institutes to illustrate PALMS principles in action. In this activity, the learners explore through hands-on, inquiry-based investigations.

BEST COPY AVAILABLE

Michigan

Governor: John Engler

Principal Investigator: Teressa V. Staten

Point of Contact: Nancy Mincemoyer,
Project Director
Michigan Statewide
Systemic Initiative
Michigan Department
of Education
P.O. Box 30008
Lansing, MI 48909
Phone: 517-373-4990
FAX: 517-335-3241
EMail: nmincemo@ssi.edc.org

5-Year Award: $9,990,970

Context

Michigan's economy has long been dominated by the automobile industry, and although Michigan ranks first in the nation in automobile manufacturing, auto employment has fallen from 437,000 in 1978 to around 280,000 today. The state has moved to diversify into high-skill, capital-intensive manufacturing. This shift away from dependence on less skilled, assembly-line work is reflected in the passage of major education reform legislation in 1990, which, among other provisions, calls for the establishment of a set of "model core curriculum outcomes" for all students and provides incentive funds for this purpose. In 1993, additional legislation was passed that requires all districts to adopt the state academic core curriculum, including standards for mathematics and science education.

Vision

The Michigan SSI (MSSI) is implementing a strategic and comprehensive reform of mathematics and science education for all K–12 students. In an effort to achieve scientific literacy and mathematical power for all students, MSSI incorporates existing and emergent policy initiatives with the curricular, leadership, and partnership infrastructure to support school-based change in mathematics and science education.

Strategy

The primary goal of MSSI is to implement a strategic, comprehensive transformation of mathematics and science education for grades K–16, including teacher preparation. The initiative aims to coordinate and link existing reform efforts to support school-based change that is guided by a shared vision for mathematics and science learning. MSSI's seven components are to (1) examine state policies and programs that support mathematics and science; (2) work intensively with a set of Focus Districts by providing grants and technical assistance as they build coalitions for reform at the local district level; (3) strengthen the system for teacher professional development and dissemination of best practices in science and mathematics; (4) develop and implement guidelines for preservice education reform efforts in mathematics and science; (5) communicate and disseminate information to increase awareness and support for mathematics and science reform efforts; (6) develop curriculum frameworks that detail the vision, standards, and resources for mathematics and science education; and (7) comprehensively evaluate MSSI within the context of other state educational reform initiatives.

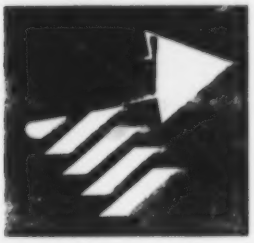
Accomplishments

1. ***Vision***

Stakeholders have drafted, reviewed, and revised a vision statement and convened a Vision Design Team to review the final version and design a dissemination process. A plan to further engage stakeholders in defining their role and developing plans of action is in progress.

2. ***Professional Development***

MSSI has mapped the professional development landscape in Michigan through group and individual interviews assessing attitudes and activities. It has hosted a statewide conference with the Michigan Science Teachers' Association (MSTA) and the Michigan Council of Teachers of Mathematics (MCTM) for professional development providers, and has presented to 350 science and mathematics educators at various conferences including the Michigan Association of School Boards (MASB). MSSI has also compiled a professional development resource database for science and begun work on a similar database for mathematics; databases include



program listings, summaries of services provided, and contact names.

2. Communications

Communications became an official component of MSSI in fall 1993. Articles about MSSI were published in several journals, including the *MASB Journal*, MCTM's *Mathematics in Michigan*, and the Michigan Association of Supervision and Curriculum Development's *MASCD Focus*. MSSI has circulated 2,000 copies of the first-year annual report; published three issues of a newsletter, *MSSI Exchange*, each with a circulation of 15,000; and developed two information sheets, *Quick Facts*, providing information about professional development and funding opportunities, and the *MSSI Communicator*, a bimonthly update for the MSSI Steering Committee. Currently, MSSI provides information on its activities on the State Department of Education's (SDE) computer network, MDEnet, and works nationally with the SSI Public Awareness Group Effort (PAGE).

4. Teacher Education Redesign

MSSI held three major conferences with all 16 of Michigan's public college and university teams and other experts, resulting in a draft report addressing the challenges and opportunities in teacher preparation. The draft was reviewed and revised with input from higher education colleagues and was endorsed by deans of the college teams before being used to begin the redesign of teacher education courses.

5. Policy and Program Review

Phase 1 involved a systematic review of state policies and programs affecting mathematics and science education. The Phase 1 report maps the current state policy system and considers policy alternatives for reforming the system. Recommendations for improvement of the state policy system are being drafted. Briefings on the report have been conducted for members of the MSSI Steering Committee and Management Team, and additional briefings for SDE staff, state policymakers, and education leaders are scheduled. Phase 2 involves reviewing the local policy system in nine school districts and exploring the extent to which local policies support state and national visions.

6. Models of Effective Learning

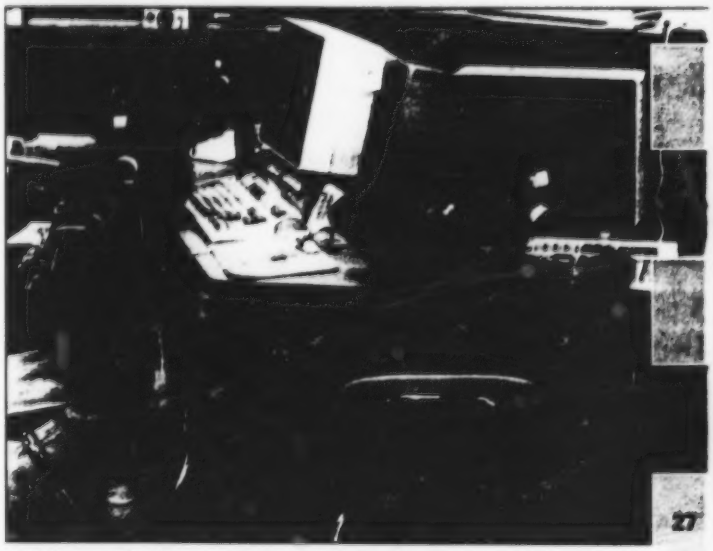
Twenty-six MSSI Focus Districts were chosen to implement a comprehensive reform of mathematics and science education. Districts have identified Design Teams, initiated the building of a supportive communication coalition, developed strategic action plans for the reform of mathematics and science education, and assessed the needs of underrepresented groups. Two conferences, each two days in length, and a week-long summer leadership institute were held as learning opportunities for the district Design Team members, and three representatives were sent to a week-long training in Complex Instruction at Stanford University.

7. Evaluation

MSSI has supported a model of evaluation that is integrated with core staff reform activities through strategic planning. It developed the MSSI Program Logic Model as a framework to more effectively focus on the entire system of reform in Michigan and has developed extensive baseline information on the Focus Districts through focus groups, interviews, and accessing of the state database. In addition, MSSI has facilitated strategic planning, evaluation design, and collaborative networking for the Focus Districts. At present, it engages in ongoing analysis of and reporting on its overall effectiveness.

Important Partners and Alliances

The MSSI has established partnerships with a variety of individuals and organizations: the Michigan Partnership for New Education, Western Michigan University, the Mathematics and Science Center Network, the W. K. Kellogg Foundation, the MSTA, the MCTM, the 4-H Extension System, and various universities and colleges.



Children at the Henry A. Doerr Child Development Center in Buena Vista, Michigan were instructed on computers in mathematics and reading.

Montana

Governor: Marc Racicot

Principal Investigators: Maurice Burke, Johnny W. Lott

Point of Contact: Johnny W. Lott
Department of Mathematical Sciences
University of Montana
Missoula, MT 59812
Phone: 406-243-2696
FAX: 406-243-2674
EMail: ma_jwl@selway.umt.edu

5-Year Award: $10,000,000

Context

Montana is the nation's fourth largest state geographically. Despite its size, Montana's population is slightly less than 800,000, with over 10% of its inhabitants residing in Billings. Montana's urban and rural residents are about evenly divided. The economy of Montana's urban areas depends heavily on service industries, while rural industry varies according to the natural resources available in the specific location. Although the majority of Montana's population is Caucasian, Native Americans represent a substantial minority, constituting 6% of the general population and approximately 10% of the student body. In contrast, only 0.7% of secondary mathematics teachers are non-Caucasian.

Vision

The Montana Council of Teachers of Mathematics's vision of the Systemic Initiative for Montana Mathematics and Science (SIMMS) is to restructure secondary mathematics education in Montana through an integrated approach. With the Montana Science Teachers Association and the Montana Science Advisory Council, science education considers several approaches to integration. A science-mathematics plan is being coordinated with Goals 2000. An overriding goal is for all students to be able to solve complex problems; have a vision of the interrelatedness of the world, nature, and human cultures; and become lifelong learners so that they can adapt to accelerating change.

Strategy

The SIMMS program is (1) redesigning the 9–12 mathematics curriculum and assessment using an approach that interfaces other disciplines with the mathematics curriculum; (2) incorporating the use of technology throughout mathematics education; (3) developing an action plan to increase the participation of females and Native Americans in mathematics and science; (4) establishing new certification and recertification standards for teachers; (5) developing extensive inservice preparation for teachers in grades 9–16 to implement integrated mathematics programs; (6) developing the supporting structure for legislative action, public information, and general education of the populace necessary for effective implementation of new programs; (7) developing a reformed mathematics curriculum for teacher preparation; and (8) developing and designing a plan for systemic change of Montana's science curriculum.

Accomplishments

1. ***Grades 9–12 Mathematics Curriculum***
The grade 9 curriculum was piloted with positive preliminary results on standardized and open-ended tests. The grade 10 curriculum was prepiloted and revised for piloting during 1994–95. Drafts of a curriculum for grades 11 and 12 were completed.

2. ***Inservice and Preservice Education***
Inservice programs, including summer institutes and extended study courses, were provided to 305 of Montana's 534 secondary mathematics teachers. Courses for preservice teachers in mathematics and science were revised.

3. ***Technology Grants***
A coordinated grants program involving the Montana State Legislature, the Office of Public Instruction, and SIMMS resulted in 103 of Montana's 171 secondary schools purchasing the technology necessary to implement the SIMMS curriculum. The goal is to have one computer for every four students and to have graphing calculators for all students.

4. ***Communications***
Workshops and presentations were provided at various meetings and conventions. Articles were pub-

THE SYSTEMIC INITIATIVE FOR MONTANA MATHEMATICS & SCIENCE
SIMMS
PROJECT

lished in newsletters. A weekly report was circulated to all committee chairs and interested individuals. Additionally, a quarterly report was provided to the community at large, and a speakers bureau was formed. Through the governor's office, a grant was obtained to enlarge the communications effort.

3. ***Underserved Populations***

Participation by Native Americans in mathematics and science fields was encouraged through collaboration of SIMMS with the American Indians in Mathematics Project. All seven tribal colleges and the reservation schools were actively involved in reform efforts. All state and tribal schools were linked through telecommunications. Additionally, to encourage increased awareness of girls and women in mathematics and science, cases of materials were prepared and sent to schools throughout the state.

Important Partners and Alliances

The infrastructure for mathematics reform in Montana is already in place, in the form of the Montana Mathematics and Science Coalition, which includes the Montana State Legislature; Montana Schools Cost Sharing; the commissioner of higher education; the Office of Public Instruction; the Office of the Governor; Texas Instruments, Inc.; and Microsoft, Inc.

Kao Lee and Kou Moua using paper folding techniques in the "Traditional Designs" module.

Nebraska

Governor: E. Benjamin Nelson

Principal Investigators: Teresita Aguilar, Doug Christensen, Elizabeth Kean, Jim Lewis, Sandra K.Scofield, Melvin C. Thornton, Lois Veath

Point of Contact: Sandra K.Scofield, Project Director
Nebraska Mathematics and Science Coalition
P.O. Box 880231
Lincoln, NE 68588-0231
Phone: 402-472-8965
FAX: 402-472-9311
EMail: nmsi@unlinfo.unl.edu

5-Year Award: $10,000,000

Context

Nebraska has a population of about 1,600,000, ranking it 36th in the nation. Nearly 63% of Nebraska's population resides in urban areas. Agriculture, food processing, and service industries such as finance, insurance, and real estate play a major role in Nebraska's economy. In 1993, the state ranked first in the nation for the number of operating public school districts (707), although it ranked 37th for the number of public school students, with an enrollment of just over 280,000 (1992). Slightly less than 11% of Nebraska's K–12 public school students are minorities.

Vision

The Nebraska Math and Science Initiative (NMSI) is dedicated to making high-quality mathematics and science education available to all Nebraska students, K–12, including populations that have traditionally underachieved in these areas. NMSI creates public awareness of and support for mathematics and science education. NMSI is also working to build the Nebraska Mathematics and Science Coalition (NMSC) into an organization capable of sustaining NMSI programs after federal funding is exhausted in 1997.

Strategy

The NMSI Key Result Areas include: (1) developing the nonprofit Nebraska Mathematics and Science Coalition (NMSC) to carry on the work begun by NMSI after the life of the NSF grant and to provide a permanent advocate for mathematics and science education through seven regional coalitions; (2) addressing the needs of underrepresented groups by involving other cultures in learning and by improving the achievement of students traditionally unsuccessful in mathematics and science, using as one strategy a Community Science Program that helps education providers outside of the K–12 system to offer educational programs in science; (3) promoting the use of technology to enhance classroom learning through workshops for teachers and the use of the Internet to identify classroom resources; (4) assessing the value and impact of NMSI activities and developing a means for measuring systemic change; (5) providing professional development for teachers and administrators through a lead teacher model, the Teacher and Curriculum Enhancement Project, and through the Curriculum Frameworks/ Model Programs dissemination network, which provides access to new curricula and teaching strategies; and (6) enhancing public awareness by targeting both educators and the general public through the use of a variety of media, including newspapers, radio, TV, newsletters, and a speakers bureau.

Accomplishments

1. *Distance Learning*

Following a two-day assessment conference for 350 participants, over 40 individuals are continuing their investigation of assessment through four one-day meetings between August and March. An Action Research model is being used. *Math Vantage*, a series of video and print materials that help students in grades 6–9 make the transition to algebra, has been used by 150 teachers in 150 schools; *Math Vantage* is now commercially available. The Practical PreCollege Mathematics course was broadcast live via satellite with two-way audio three times each week to 30 sites, which included a total of 300 college-bound high school seniors. A measure was passed by the Nebraska Unicameral making the Internet available to all schools; an Internet network server was installed and maintained at the Nebraska Department of Education, and 15 servers were installed at Educational Service Units. Two professional development videos for teachers have been produced and disseminated, with a third under development.

NEBRASKA MATH & SCIENCE INITIATIVE

2. ***Classroom and Community Learning***
Eighty-eight lead teachers were prepared through the Teacher and Curriculum Enhancement Project to provide inservice programs for teachers within the partner districts. Approximately 5,000 curriculum frameworks were distributed, and 26 teachers prepared to make frameworks presentations in the 1995 K–12 Project workshops. Summer day camp was held on the Omaha Reservation, hosted by the Community Science Program, with 34 students, four tribal elders, and nine other adults participating.

3. ***Regional Math and Science Coalitions***
Seven regional coalitions were established, and a conference was held for coalition teams to develop a vision, agree on a system of communication and accountability, and create a needs assessment model. Ongoing development of the regional coalitions is a major focus of NMSI activities.

4. ***Public Awareness***
The NMSI newsletter was received by over 3,000 teachers and community members. News-story feeds to newspapers averaged 7/month; responses to radio feeds averaged 13/month; and recent TV coverage of NMSI activities averaged 1/month. A speakers bureau video was produced and is used by regional coalitions and supporters for presentations to community groups.

Important Partners and Alliances

NMSI is an organized collaboration of efforts by K–12 educators, colleges and universities, the Nebraska Department of Education, professional organizations, the NSF and members of the business and industry community. These partnerships have strengthened the vision of the initiative and have helped leverage short-term projects into long-term, systemwide changes in the way students learn. Major partners are the Nebraska affiliates of the National Science Teachers Association and National Council of Teachers of Mathematics; the Nebraska Energy Office; the Nebraska Department of Education; the Nebraska Educational Television Network; the University of Nebraska at Lincoln; the Nebraska Mathematics and Science Coalition; the Office of the Governor; Chadron State College; Wayne State College; the University of Nebraska at Kearney; the Broken Bow Public Schools; Westside Community Schools; Lincoln Public Schools; Elkhorn Public Schools; the Grand Island Northwest Consortium; Omaha Public Schools; North Bend Public Schools; Educational Service Unit (ESU) #1, ESU #13, ESU #14, and ESU #16; the Panhandle Coalition; the East Central Coalition; the Southeast Coalition; the Central Coalition; the Eastern Coalition; the Western Coalition; and the Northeast Coalition.

Filming for Math Vantage *series tape, "A World of Quadrilaterals," at Ashfall Paleotological Dig in Nebraska.*

New Jersey

Governor: Christine Todd Whitman

Principal Investigator: Gerald A. Goldin, Rebecca L. Lubetkin, Ellen Schechter

Point of Contact: Gerald A.Goldin, Project Director
Center for Mathematics, Science, and Computer Education
SERC Building, Room 239,
Rutgers, The State University of New Jersey
Piscataway, NJ 08855-1179
Phone: 908-445-3538
FAX: 908-445-3477
EMail: gagoldin@zodiac.rutgers.edu

5-Year Award: $10,000,000

Context

New Jersey is the most densely populated state in the nation. The African American community, which composes more than 13% of the population, approximates the national average, as does the Hispanic population. A high proportion of the work force is engaged in high-tech industries, electronics, computer software, and research-oriented activities such as pharmaceuticals and chemistry. New Jersey has a student population of approximately 1,200,000, of which nearly one-third is minority. The state has 600 autonomous school districts, each of which is responsible for meeting statewide standards established by the State Board of Education. The resulting diversity poses special challenges to systemic reform.

Vision

The New Jersey SSI, called Achieving Excellence in Mathematics, Science, and Technology Education, incorporates a new vision of excellence in these fields. This vision is aimed at encouraging all children to value mathematics and science as useful subjects; allowing students to learn in cooperative and exploratory ways, thereby fostering meaningful learning; integrating mathematics and science with each other and with other disciplines; developing science and mathematics as living fields of study, thus creating new learning environments; integrating the use of technology into learning; encouraging risk taking and experimentation in K–12 instruction; developing alternative assessments; strengthening the continuing professional development of teachers; raising school expectations; and improving access to quality instruction for females and underrepresented populations.

Strategy

New Jersey's approach to systemic reform is based on establishing linkages and substantive collaboration among those who share the goal of achieving excellence in mathematics, science, and technology education. Responsibility for management and coordination of the SSI is a partnership between the New Jersey Department of Education and Rutgers, The State University. At the direction of the State Board of Education, the New Jersey Department of Education is developing a five-year plan for systemic reform. The plan and its implementation will provide a policy context for the reforms sought in mathematics, science, and technology education.

The strengthening of mathematics, science, and technology education in grades K–8 is being achieved through professional support networks among schools and 14 New Jersey SSI partner institutions. The establishment of models for K–12 reform is being achieved through partnerships, representing a cross section of the state's economically and culturally diverse resources. The effective use of telecommunications networking is being fostered to encourage the sharing of educational practices and to promote closer collaboration among New Jersey SSI participants.

Accomplishments

- ***Professional Development***

The New Jersey SSI has focused on the establishment of ongoing professional support networks, allowing teams of teachers and administrators to work with faculty, staff, and resource personnel at 14 partner institutions; activities have included exploration of topics and experiences in teaching mathematics, science, and technology in elementary and middle schools. Approximately 150 schools were involved in the recent summer institutes, hosted by partner institutions. Implementation will continue throughout the academic year.

NJ/SSI

2. Restructuring

Efforts are being aimed at the creation of models for districtwide, K–12 restructuring of mathematics, science, and technology education, in partnership with statewide resources. Proposals are being reviewed from 14 districts, with implementation of these models expected to begin between fall 1994 and spring 1995. Districts that have not submitted proposals will have the opportunity to do so in future review cycles.

3. Technology

Implementation of New Jersey's Technology Action Plan is underway to support and encourage the use of telecommunications linkages among New Jersey SSI participants; over 500 schools, districts, and statewide resources will ultimately be interconnected in this networking infrastructure. Partners provide technical assistance, user support, and compelling educational applications of telecommunications technology to promote classroom use and professional development. A proposal co-sponsored by the SSI has received approval by the NSF and will begin implementation in 1995.

4. Other Reform Initiatives

In collaboration with the New Jersey Department of Education, the SSI is developing curriculum frameworks in mathematics that will align with the general standards for the state. This fall, over 6,000 copies of a draft of the *New Jersey Science Content Standards* were disseminated for review. The New Jersey Institute of Technology, along with three other institutions of higher education, has proposed to improve preservice teacher education. To publicize SSI efforts, New Jersey has hosted an annual "Math/Science/Technology Month," along with a televised open forum or town meeting on mathematics, science, and technology.

Important Partners and Alliances

New Jersey's SSI is based on the establishment of partnerships. Among the major cooperating institutions are the 14 partner sites: the County College of Morris, the Educational Information and Resource Center; Fairleigh Dickenson University; the Liberty Science Center; Montclair State University; the New Jersey Institute of Technology; the New Jersey Marine Sciences Consortium; Rowan College; Rutgers, The State University; Upsala College; the Stevens Institute of Technology; Trenton State College; the Merck Institute of Science Education; and Kean College. Designated statewide resources include the New Jersey Business/Industry/Science Education Consortium, the Center for Improved Engineering and Science Education, the Academy for the Advancement of Science and Technology, the New Jersey Mathematics Coalition, and the Consortium for Educational Equity. Other cooperating institutions, in addition to the New Jersey Department of Education, include the Educational Testing Service, the Princeton Plasma Physics Laboratory, Bell Atlantic New Jersey, Bellcore, the state library, the New Jersey Network, the New Jersey Intercampus Network, and the Mid-Atlantic Eisenhower Consortium for Mathematics and Science Education at Research for Better Schools.

New Mexico

Governor: Gary Johnson

Principal Investigators: Bruce Hamlett, Judith Kaye, John Whitley, Albert Zamora

Point of Contact: Marion Finch, Executive Director
New Mexico's SSI
in Mathamatics and
Science Education
1300 Camino Sierra Vista, Suite E
Santa Fe, NM 87505
Phone: 505-983-2433
FAX: 505-983-2326
EMail: mfinch@ssi.edc.org

5-Year Award: $9,944,000

Context

Although New Mexico is larger in area than New England, New York, and Pennsylvania combined, its population is less than that of a midsize metropolitan city. One-third of the state's population resides in Albuquerque, with much of the remaining population living in rural communities. New Mexico is a leader in energy research and development as well as in high-tech industries. It ranks eighth nationally in per capita doctorates in physical sciences and engineering and third in the percentage of students enrolled in high school mathematics courses.

Vision

The vision of the New Mexico SSI in Mathematics and Science Education (SIMSE) is to improve, reform, and redirect mathematics and science education, including classroom instruction, teacher professional development, student assessment, state policies, and nontraditional educational experiences outside the classroom. SIMSE believes that local control and direction best accomplish the shared responsibility and leadership necessary for the effective and efficient use of public and private resources and the continuing involvement of parents and communities in the educational process. Our vision of mathematics and science education for New Mexico children defines a paradigm that embraces the following principles: learning as activity; science and mathematics as understanding; students as workers; curriculum as integrated experiences; education as a self-renewing enterprise; and all stakeholders "working together today for tomorrow."

Strategy

SIMSE has undergone a realignment during its second year. Major changes in the governance structure include the addition of principal investigators from the Department of Education and from the Commission of Higher Education. This new structure positions the initiative to successfully institutionalize its reform efforts into the education system of the state. SIMSE works in collaboration with the Council to Advance Mathematics and Science Education (CAMSE), a business and educational leadership council created to guide mathematics/science systemic change in New Mexico by coordinating existing federal, state, and local resources. Progress is also being made in aligning SIMSE schools with other science and mathematics initiatives in the state. Most significant of these developments is New Mexico's Goals 2000 effort, which is building on the reform base started by the SSI. CAMSE is serving as the science/mathematics committee for this effort.

Incorporating strategies from the Re:Learning program and aligning with national standards, SIMSE, along with its field specialists and university partners, provides teacher professional development through Summer Institutes, school-year professional development sessions, and continual technical assistance to schools; updates curricula; and incorporates the latest advances in instructional and communications technology. To build capacity for science and mathematics leadership at the school and district levels, Change Agent Teams (CATs) have been established and are supported by higher education faculty, scientists and mathematicians from national laboratories, K–12 teachers, State Department of Education staff, and community liaisons.

SIMSE now has five regional centers across the state assisting 121 schools with inservice workshops and technical assistance during the school year. Regional offices provide clearinghouses and networking services to the schools. SIMSE promotes school-based change to reform mathematics/science/technology education at the district, community, and state levels.

SIMSE

Accomplishments

1. ***Institutes***
SIMSE has directly affected 43,700 K–8 students and 1,420 teachers through various Summer Institutes, including 32 one-week Summer Institutes held during 1993 and 1994 for over 960 teachers and principals and three Advanced Summer Institutes held over three-week periods. In addition, SIMSE sponsored 370 participants to attend Marilyn Burns' "Math Solutions" professional development program.

2. ***Regional Centers and Field Specialists***
Five field specialists work in five regional centers across the state, assisting 121 SIMSE schools. Specialists provide leadership and guidance to the 121 CATs that work to create reform plans in SIMSE schools and districts. SIMSE schools are analyzing their classrooms and the school's quality of mathematics/science/technology education based on the Math/Science School Analysis tool developed by the field specialists with support from Re:Learning.

3. ***Change Agent Teams***
The CATs are composed of teachers and principals who have received training at the Summer Institutes, as well as parents and community leaders. All 90 of the Cycle 1 CATs have written action plans charting their visions and goals, and outlining specific steps to accomplish them. They now use these plans to obtain additional support for local reform efforts. Schools and CATs create partnerships and networks with other schools and community agents, including computer experts from New Mexico State University and White Sands Missile Range, community partners from Intel, and an astronomy program based at Harvard University.

4. ***New Mexico Coordinating Council in Science, Engineering, and Technology***
In April 1993, SIMSE facilitated the organization of the New Mexico Coordinating Council in Science, Engineering, and Technology (NMCC-SET) to build a change infrastructure in New Mexico. The council meets monthly, and all mathematics/science/technology project directors participate in the overall coordination of reform efforts throughout the state.

Important Partners and Alliances

SIMSE has established partnerships with local businesses, government agencies, national laboratories, and major science/mathematics education reform initiatives to better direct resources to the schools. Some of SIMSE's partners are the Office of the Governor; the State Department of Education; Sandia National Laboratories; Los Alamos National Laboratory; the New Mexico Council of Teachers of Mathematics; the New Mexico Science Teachers' Association; the Space Grant Consortium; Comprehensive Regional Centers for Minorities (CRCM); the Council to Advance Mathematics and Science Education (CAMSE); New Mexico Mathematics, Engineering, and Science Achievement Inc. (MESA); U.S. West; and New Mexico museums and businesses.

The focus of the partnerships and alliances is the improvement of science and mathematics education through an inclusive process whereby all stakeholders are brought to the table in developing change in curricula and content, decision-making structures, and responsibilities and strategies for educational improvement. In initiating these partnerships, SIMSE staff provides leadership and technical assistance in identifying roles for each player to build the capacity in New Mexico for improving mathematics and science education. These roles for any given player may be at the state, regional, district, and/or school level.

Hands-on science at Algodones Elementary School, Bernalillo, New Mexico.

New York

Governor: George Pataki

Principal Investigators: Walter Cooper, Hubert Dyasi, Graham Jones, Lester Rubenfeld, Thomas Sobol

Point of Contact: Carolyn Graham,
State Education Department
Room 674 EBA
Albany, NY 12234
Phone: 518-473-9471
FAX: 518-473-0858
EMail: cagraham@ssi.edc.org or
cgrahamvm1.nysed.gov

5-Year Award: $10,000,000

Context

With a population of 18,100,000, New York is surpassed in numbers only by the state of California. Nearly two-thirds of the residents live in the New York City metropolitan area and its tremendous ethnic diversity, which includes Europeans, Asians, Africans, and Latin Americans, poses a major challenge for education reform. A wide gap separates the achievement of New York's two student populations: one largely affluent, suburban, and Caucasian; the other urban and minority, composing close to 40% of the K–8 student body. The sheer number of students in New York's public school system presents a significant difficulty in administration as well as in systemic reform efforts. The state's many centers for research in such areas as electronics and biotechnology provide potential resources for initiatives in mathematics and science education reform.

Vision

New York State's vision for teaching and learning, called "A New Compact for Learning," is the cornerstone of its reform efforts.

> All children can learn.
> The schools we envision are exciting places: thoughtful, reflective, engaging, and engaged. They are places where meaning is made... Their spirit is one of shared inquiry. The students in these schools feel supported in taking risks and thinking independently. They are engaged in initiating and assessing their ideas and products, developing a disciplined respect for their own work and the work of others
>
> – *Learning-Centered Curriculum and Assessment for New York State.*

To operationalize the vision in Mathematics, Science and Technology (MST), the state's Urban Network Project (UNP) works with the six largest urban districts in the state to address three components of systemic change: (1) *Structure.* The compact provides a framework that enables school districts to restructure policies, procedures, and organizational structures. It defines the roles and responsibilities of community members in educating all children, provides for regulatory flexibility, and specifies high expectations and standards statewide for grades K–12. (2) *Practice.* Under the compact, a draft framework for MST curriculum and assessment has been produced. For the recommended changes to take place in the way MST is taught and learned, teachers need learning experiences to engage their own curiosity and imagination, provide them with fundamental content understanding, and enable them to work with students of diverse backgrounds. (3) *Culture.* To achieve the first principle of the compact—all children can learn and can succeed—the attitudes, beliefs, assumptions, and behavior of all stakeholders in the schools must be fundamentally changed.

Strategy

UNPs key strategy is to operationalize the state's reform effort in the six largest urban districts in the state: Albany, Buffalo, New York City, Rochester, Syracuse, and Yonkers. Under UNP, each district employs an Urban Partnership coordinator, who links the district with community organizations and members interested in education and helps align district, state, and federal resources. Across the six districts, 12 Research and Demonstration (R&D) Schools have been established to serve as "in vivo" laboratories for MST reform and restructuring. When strategies and processes that successfully raise expectations and standards for MST are identified in these schools, they will be quickly shared with other schools in the urban districts and with schools throughout the state. Since MST is also the first subject area to be reformed in New York State, lessons learned in the R&D schools will serve as prototypes for restructuring in other subject areas.

Accomplishments

- ***Compact Initiatives***

The New York SSI has begun large-scale distribution of *Learning-Centered Curriculum and Assessment for*

New York State Systemic Initiative

New York State, the report of the state's Curriculum and Assessment Council, which provides the state's vision for schooling and frames the development of new frameworks and assessments. 170,000 copies of the draft MST framework have been distributed for public discussion and comment.

2. ***State-Level Coalitions for Decision Making and Information Sharing***

The SSI established an MST Management Team, consisting of representatives from the Curriculum and Assessment Council, regional field teams, the Compact Action Team, public broadcasting, teacher certification, and Eisenhower higher education. The SSI established a computer Mega-Network to coordinate MST networks and the MST professional associations. Regional meetings have been held to engage all members of the MST community in the revision of the MST Framework.

3. ***District Change through Urban Partnerships***

Urban Partnership Boards have been established and coordinators have been selected in the six urban school districts. Twelve R&D schools have been selected in response to a competitive request-for-proposals process. District Resource Teams in MST have been established, university school reform facilitators identified, and a Principals' Group formed to facilitate R&D school reform efforts. A needs assessment has been created and administered in R&D schools. School teams participated in a statewide Restructuring Institute, an Equity Institute, and three summer Teaching and Learning Institutes. Funding from the federal Eisenhower program and the state legislature have been received to develop field-based teacher preparation programs and staff development programs in some R&D schools. R&D school Quality Review Teams participated in a statewide school Quality Review Institute and in small self-review planning meetings.

4. ***Public Awareness***

The SSI held a statewide teleconference on the MST Framework at 33 sites for 1,500 participants. Public television stations broadcast four videos on MST issues during prime-time and after-school hours.

Evaluation

An evaluation plan has been developed. Planning is under way for data collection, including video documentation by public television and the development of case studies in key schools. Each R&D school will undergo a week-long Quality Review by spring, 1995.

Important Partners and Alliances

New York, a large and diverse state, has many constituencies. Compact initiatives include the Chancellor's Coalition and Assessment Council and the Curriculum and Assessment Council for MST, both of which represent the state's major educational stakeholders. Within UNP, a statewide Advisory Committee represents all stakeholders and has four Working Committees, each responsible for guiding the work of the project in key areas and each cochaired by a member of the Steering Committee and an Urban Partnership coordinator. The New York SSI also benefits from the support, involvement, and active participation of museums, colleges, universities, professional associations, and industry. Because of the way the educational system is structured, the State University of New York, with the State Education Department as its administrative arm, is in a uniquely powerful position to set policy that will lead to fundamental changes in the infrastructure of education.

North Carolina

Governor: James B. Hunt, Jr.

Principal Investigator: Susan Friel, Tom Houlihan, Henry Johnson, John Thomas

Point of Contact: Tom Houlihan
Office of the Governor
116 West Jones Street
Raleigh, NC 27603-8001
Phone: 919-715-3535
FAX: 919-733-1753

5-Year Award: $7,856,586

Context

A 13% population growth during the 1980s made North Carolina the 10th most populous state, with more than 1,100,000 students. About 33% are minorities, 18% live in rural areas, and an additional 13% reside in the metropolitan areas of Charlotte and Raleigh. Approximately 30% of the students do not finish high school. North Carolina is moving to a more decentralized educational structure, with school reform being driven by every school and its surrounding community.

Vision

The North Carolina Science and Mathematics Alliance envisions (1) all students participating in and attaining high standards of performance in science, mathematics, and technology; (2) a transformation of science and mathematics instruction into active, inquiry-based explorations and problem solving conducted by students and guided by confident, well-equipped teachers; and (3) all stakeholders aware of and actively involved in the delivery and support of excellent science and mathematics teaching and learning.

Strategy

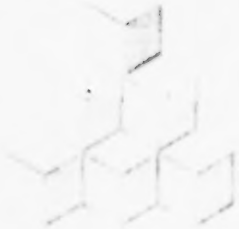
The North Carolina SSI is a public-private venture sponsored by the North Carolina Board of Science and Technology. The SSI is a comprehensive collaboration of various organizations and individuals supporting the state's Department of Public Instruction (DPI) in carrying out its legal mandate to provide quality science and mathematics education to all children. A network of regional consortia, including the DPI Regional Technical Assistance Centers, the Alliance's partnerships, and the University of North Carolina's Mathematics and Science Education Network (MSEN) Centers, are working with local school districts and schools to effectively plan and implement reforms, improvements, and programs to enhance the variety, quality, and participation levels in science and mathematics for all children.

The SSI is providing and improving educational resources and classroom instruction through teacher education and staff development; introduction and nurturing of technology and staff training in support of technology; curriculum review and improvement; preservice teacher education; community, business, and parental involvement; partnership building; and a variety of actions that address the broad issue of equity. To serve some rural/underserved schools, the SSI is developing elementary resource teachers, mobile science laboratories, and equipment resources and is facilitating the use of technology to connect teachers, schools, and classrooms. The SSI is committed to improving the access and participation of minorities and females by promoting hands-on summer science camps, peer tutoring, academic clubs, precollege programs, and role-modeling activities, including classroom involvement with female and minority scientists. Teacher-industry exchange programs are bringing business and research specialists into classrooms and placing teachers in research and business environments to broaden their awareness of real-world science and mathematics applications.

Accomplishments

1. ***Leveraging of Resources***
Funds provided by NSF represented 33% of the resources available to the Science and Mathematics Alliance in the third year, compared with 55% in the first year and 42% in the second year.

2. ***Partnership Development and Enhancement***
Twelve Regional Partnerships were established, serving 80 of North Carolina's 100 counties and over 80% of the student population. Over 9,000 teachers, 370,000 students, 800 parents, 4,000 business/industry personnel, and 300 school administrators were reached in 1993–94 for a total of 200,000 contact hours that involved the following kinds of activities to improve mathematics and science teaching



NORTH CAROLINA
Science and
Mathematics

and learning: collaboration among practicing scientists and engineers, higher education representatives, and K–12 teachers in the classroom and the workplace; professional development for teachers; K–12 needs assessment and goal setting at the building level; and regional support in human and financial resources for collaborative partnership efforts.

3. ***Science-Based Support***
Outdoor labs were developed at 10 schools, with the faculty at each school prepared to teach experiential science. High-end computer workstations were provided to 10 schools, and two lead teachers and administrators from each school were prepared and technically supported in the classroom use of these computers. For the third year, summer science camps were held for elementary teachers and students at six sites across the state, with two additional camps sponsored by Glaxo, Inc., for its employees.

4. ***School-Based Planning***
A building-level needs assessment process for improving mathematics and science education was piloted by schools in two Regional Partnerships.

Important Partners and Alliances

The Alliance is working closely with other statewide organizations focused on systemic change, including the DPI, the MSEN, North Carolina community colleges, the University of North Carolina system, science and technology museums, the Public School Forum, the Rural Economic Development Center, the State Information Processing System, the MCNC, and the North Carolina School of Science and Mathematics. State-level relationships exist with companies such as Glaxo, IBM, and Southern Bell; with various agencies that employ scientists and engineers; and with private colleges and universities such as Duke and Wake Forest. Each Regional Partnership is also creating its own local collaborative efforts.

Analyzing trash and dividing it according to categories.

Ohio

Governor: George Voinovich

Principal Investigators: Jane Butler Kahle, Kenneth G.Wilson

Point of Contact: Jane Butler Kahle
Project Discovery
Miami University
420 McGuffey Hall
Oxford, OH 45056
Phone: 513-529-1686
FAX: 513-529-2110
EMail: kahle_j@msmail.muohio.edu

5-Year Award: $9,990,970

Context:

Ohio has a population of 11,000,000, 74% of whom reside in urban communities. Twelve percent of Ohio residents are Appalachian, 11% are African American, and 1% is Hispanic. The student population is 1,700,000, 17% of whom are ethnic minorities. Ohio ranks sixth in the nation in science-based and technology-based industry, and ninth in the number of small firms active in high technology. Such workplaces can serve as important resources for teachers who are searching for opportunities to link their classrooms with the scientific community. Educational reform efforts are strongly supported in the state as evidenced by the $2,000,000 in matching state funds that Ohio's SSI has received each year of the funding period.

Vision

Project Discovery is Ohio's statewide effort to improve educational outcomes in mathematics and science. It was designed to serve as a catalyst for educational reform by building consensus for educational goals, improving education, and creating professional development opportunities for mathematics and science teachers at levels K-16, with an initial focus at the middle school level. Discovery's shared governance and implementation structure replace the traditional hierarchical method of establishing curricular and instructional objectives with dynamic, interactive approaches. Its professional development program includes solid grounding in content areas, practice with inquiry-based instruction, and experience with research strategies assessing changes in student learning. Teachers on all levels share the responsibility for progress in effective teaching with the broader community. Their schools and regional organizations are expected to assume leadership roles as change agents in education.

Strategy

Project Discovery is (1) enhancing teachers' knowledge of mathematics and science and improving their skills in teaching those subjects; (2) establishing a core of mathematicians, scientists, and teacher leaders at eight regional centers to conduct professional development programs and to support teachers in local schools; (3) enhancing the professionalism of teaching/learning by promoting participation in professional activities, establishing networked peer interactions, and sharing exemplary teaching and research practices; (4) using technology to address the need for high-quality, inquiry-based instruction for large numbers of students; (5) institutionalizing the inquiry courses in undergraduate programs across Ohio, particularly in programs for preservice teachers; (6) introducing new approaches to evaluation and assessment that complement inquiry-based instruction; and (7) increasing public understanding of the need for a scientifically and mathematically literate citizenry involving parents, community members, and the private sector as partners with the school.

Accomplishments:

1. ***Professional Development***

Intensive six-week Summer Institutes in Physics, Life Science or Mathematics by Inquiry, supplemented by academic year professional development seminars, have been completed by more than 675 middle school teachers. Fifty-four K–12 teachers have completed year-long professional development and Leadership Team training programs. In addition, more than 2,500 teachers have received introductory training in special sessions conducted by Leadership Teams. In 1994, a district-wide inservice program was initiated as a pilot for accelerating expansion of Discovery throughout K–12, and a Resource Teacher Institute was developed to accelerate expansion of Discovery's middle school program.

2. ***Regionalization of Services***

All eight Discovery regional collaborations are in

The Ohio Mathematics/Science Project

Discovery

operation, ahead of schedule, and are taking increasing responsibility for support of regional and statewide coordination. Discovery Regional Institutes have increased from four in 1992 to 19 in 1994 while the number of colleges and universities giving credit for the Institutes has increased from two to nine. The number of University faculty responsible for preservice education who have been trained at Discovery Institutes has risen from five to 20 in the same period.

2. Networks
Discovery is engaged in plans to integrate services with the Ohio Department of Education's eight Regional Professional Development Centers, and is providing technical assistance to the Urban Systemic Initiatives (USIs) and Rural Systemic Initiatives (RSIs) in proposal development and fiscal support so that USI and RSI teachers can attend Discovery Institutes.

4. Uses of Technology
DiscoveryNet is utilized by over 800 Discovery-trained teachers, personnel, and community volunteers for discussions about lesson plans, curriculum development, and professional growth opportunities. The network is supported by the Ohio Department of Education. In addition, Discovery has developed a statewide database to provide preliminary information on teacher participation, district representation, and funding sources for demographic analyses. Summer Institutes demonstrating the use of computers to enhance inquiry-based teaching strategies have expanded from two in 1992 to 12 in 1994.

3. New Approaches to Evaluation and Assessment
Journals and portfolios are being used to document teacher change throughout their year-long experiences with Discovery. A mathematics test, using NAEP public-release items, was developed internally to measure the impact of Discovery teachers on their students. The material selected for the Ohio-specific test focused on inquiry and problem-solving. Initial results show that the 873 students of Discovery teachers had a higher percentage of correct answers as compared to the 718 student controls on 18 out of the 20 test questions. A comparable science test is presently under development. Teams of university faculty and K-12 teachers, led by the Statewide Academic Coordinator, are responsible for test development as well as Summer Institute quality and integrity.

5. Public Awareness
Programs that target minority communities to increase involvement of teachers, parents, and businesses in mathematics and science education are being implemented to enhance minority recruitment and participation in Discovery. Established in 1993, an Equity Team—with African American, Latino, and Caucasian representatives—conducts research on equity issues, reports findings, recommends plans of action, develops and implements equity programs for all 19 Summer Institutes, and collaborates on teacher recruitment.

Important Partners and Alliances

Project Discovery is supported by the Ohio Board of Regents, the Ohio Department of Education, the Ohio General Assembly, community foundations across the state, federal Eisenhower funds, the U.S. Department of Education, the U.S. Department of Energy, Miami University, and The Ohio State University.

Somchay Sorasin, Amanda Jaconette, Brandon Chapman and Jimia Smith.

Puerto Rico

Governor: Pedro Roselló

Principal Investigator: Manuel Gómez

Point of Contact: Pedro Rodríguez-Esquerdo,
Project Director
Puerto Rico SSI
Resource Center for Science
and Engineering
University of Puerto Rico
P.O. Box 23334
San Juan, PR 00931-3334
Phone: 809-764-7320
FAX: 809-751-0625
EMail: mgomez@ssi.edc.org

5-Year Award: $10,000,000

Context

Puerto Rico, an island of 3,450 square miles, has a population of 3,400,000. Manufacturing, mainly pharmaceutical-related and computer-related, contributes 39% of the gross domestic product. The Commonwealth Department of Education is the sole centralized department of education. Puerto Rico's 650,000 students attend 1,600 schools in 100 school districts. The Puerto Rico SSI (PR-SSI) is being developed within a recent, state-mandated education reform law that recognizes the urgent need to intensify and improve science and mathematics education for all students and creates community schools with decision-making powers.

Vision

The following principles constitute the vision for the PR-SSI: (1) the teaching of science and mathematics must be intensified in order to build the scientific literacy of all students; (2) curricula must aim at developing depth of understanding and integration of knowledge by building students' higher-order thinking skills and motivation, must follow the "less is more" approach, and must facilitate the ability to make meaningful connections between concepts and experience; (3) teachers should be empowered with the knowledge and skills to create a truly effective learning environment based on the ability to integrate content and teaching methods; (4) authentic assessment of teaching and learning based on performance outcomes must be a central component in the learning process and used to improve teaching effectiveness; (5) procedures to ensure systemic assessment and accountability must be established to promote systemic changes; and (6) a greater degree of autonomy at the local school level and community involvement are necessary to transform science and mathematics education.

Strategy

A tripartite alliance was created composed of (1) The Commonwealth Department of Education, which has direct responsibility for statewide implementation of the educational reform; (2) the Resource Center for Science and Engineering, which links higher education institutions throughout the system with the Center's teacher education and science and mathematics programs; and (3) the Puerto Rico General Council on Education, which establishes standards of excellence and accountability systems. This alliance has spearheaded an articulated, systemic reform that aims at empowering teachers and schools to effect changes, transforming K–12 preservice curricula, and establishing effective assessment and accountability systems.

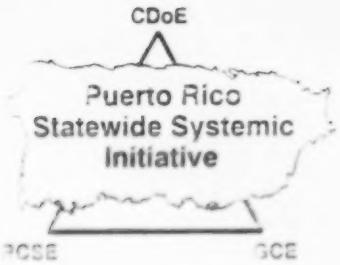
Accomplishments

1. ***Curriculum Development and Dissemination***

Intermediate-grades curricula have been field-tested by 77 teachers in nine schools, affecting over 4,550 students. Starting in 1994, seven of the intermediate pilot schools began serving as Regional Dissemination Centers to train teachers from 60 additional schools (200 teachers and 11,000 students) throughout the island. Elementary revision, to be completed in 1995, includes field testing in nine pilot schools with 220 teachers, to affect 4,700 students. High school revision is being initiated in 1994.

2. ***Teacher Empowerment and Preservice Educational Reform***

The preservice Reform Program involved five major higher education institutions, including interdisciplinary collaborations among science, mathematics, and education faculty. The Induction into Teaching program provided training for a total of 80 teachers throughout the island. Programs sponsored by federal Eisenhower funds provided training for teachers



in curricular content, teaching strategies, and assessment methods aligned with the PR-SSI curricula.

3. ***Technology-Based Communication and Awards for Excellence in Teaching***
An electronic network has been established and teacher training provided in intermediate and elementary PR-SSI schools. Fifteen teachers have been awarded up to $5,000 each for excellence in teaching and are using these monies to develop and test innovative projects in their classrooms.

4. ***School Empowerment***
Curricular revision is being implemented through a whole-school strategy that empowers schools to restructure themselves and achieve systemic change at the school level. Pilot schools are being established as Regional Dissemination Centers to facilitate the empowerment of other schools.

5. ***Authentic Assessment***
School assessment instruments have been field-tested to assess the overall effectiveness of revised curricula. Teachers have incorporated authentic assessment methods in the classroom.

6. ***Systemic Assessment and Accountability***
Standards of excellence in science and mathematics content and assessment for K–12 that are aligned with national standards are expected to be completed in 1995. A completed draft of *Professional Standards for Science and Mathematics Teachers* has been disseminated to invite participation in the final version. The school-based assessment and accountability model has been developed and field-tested in elementary pilot schools. The *Puerto Rico Assessment of Education Progress*, an adaptation of National Assessment of Educational Progress, has been administered to measure long-range changes in the level of student achievement.

Important Partners and Alliances

The PR-SSI is supported by the Puerto Rico Manufacturers Association, the Puerto Rico Association of Mathematics Teachers, the Puerto Rico Science Teachers Association, the Ana G. Méndez University System, the InterAmerican University of Puerto Rico, Catholic University of Puerto Rico, Sacred Heart University, and the California Department of Education. The PR-SSI is also associated with the Alliances for Minority Participation Program and the Experimental Program to Stimulate Competitive Research.

Science in action in Puerto Rico.

South Carolina

Governor: David Beasley

Principal Investigators: Dennis M. Bartels, John R. Carpenter, Doris R. Helms, Andrew Hugine, Paul G. Huray, John K. Luedman, Jeffrey M. Priest, Carolyn R. Randolph, Éloise Rudy, Thomas E. Thompson, Timothy J. Walgren

Point of Contact: Dennis M. Bartels
South Carolina Department of Education
1429 Senate Street
Columbia, SC 29201
Phone: 803-734-5460
FAX: 803-734-5953
EMail: dbartels@ssi.edc.org

5-Year Award: $9,676,696

Context

South Carolina is a growing southern state, with a current population of 3,560,000. During the past two decades, the state's economy has shifted from a dependence on agriculture and rural textile manufacturing to an increasingly industrial, technological, and tourism base. A total of 663,870 students are enrolled in 1,106 public schools. Approximately 42% of public school students are minorities, predominantly African American. South Carolina has a 20-year history of educational reform on which to build the SSI.

Vision

South Carolina will provide quality and effective learning experiences in science and mathematics to guarantee literacy for all people. Mathematics and science will be taught and learned using a constructivist approach; assessment of student performance will measure the curricular and instructional experiences we value the most; schools will be reorganized to support these new teaching, learning, and testing methodologies; administrative leadership will provide the time, materials, and support for school-based improvement programs; teacher preparation and professional development programs will prepare teachers as facilitators and mentors of learning; the highest quality of instructional materials, consistent with the instructional vision in the state curriculum frameworks, will be made available to all teachers; and the public will provide its informed consent for moving mathematics and science education in these directions.

Strategy

South Carolina has an extensive history of education reform that has created numerous reform initiatives and networks operating at a variety of levels. Access to the best ideas, people, and resources for education reform has been limited, however, both by regional disparities and by the narrow focus of the program approach. In 1991, South Carolina began developing state curriculum frameworks to drive systemic changes in policy and practice. The frameworks guide policy, program, and resource allocation decisions for instructional materials, teacher and administrator preparation and professional development, student assessment, and school organization. The SC-SSI, through the creation of 13 Regional Science and Mathematics Hubs, is the primary vehicle for translating the instructional visions outlined in the South Carolina frameworks into everyday classroom practices. Specifically, the SC-SSI is building regional networks of teacher consultants who come together regularly to teach and learn from each other. These practicing classroom teachers serve as contracted consultants through the hub to assist other teachers and schools that request assistance in revamping their mathematics and science programs. Other major statewide science and mathematics initiatives, including the SC-SSI, are coordinated by the governor's Mathematics and Sciences Advisory Board (MSAB) and run parallel to the major policy changes under way as a result of the curriculum frameworks.

Accomplishments

1. ***Facilitating Change***

SC-SSI has established 13 Regional Science and Mathematics Hubs which offered five state-sponsored institutes and other inservice programs involving more than 1,600 teachers and administrators in the first year. The planning and decision making is headed by 13 Regional Advisory Boards, composed of more than 70 businesspeople, 90 teachers, and

representatives from every school district, college, and university in the state. The SC-SSI influenced the enactment of new legislation to eliminate the general education track and align instructional materials adoption criteria and school planning programs with the curriculum frameworks.

2. ***Strengthening Collaboration***
By action of the State Board of Education, South Carolina adopted a state mathematics curriculum framework and released 15,000 draft copies of the *Science Curriculum Framework* for statewide review. With the MSAB, the SC-SSI has been establishing 10-year benchmarks for mathematics and science in South Carolina and baseline student achievement data for monitoring progress toward MSAB benchmarks and SSI goals. Through a new faculty professional group, the SC-SSI has influenced 19 institutions of higher education to reexamine selected undergraduate and preservice science and mathematics courses.

The SC-SSI secured a $1,800,000 annual match from the South Carolina General Assembly for the Regional Science and Mathematics Hubs, in addition to a first-time match exceeding $2,600,000 from the NSF Alliance for Minority Participation (AMP) and Experimental Program to Stimulate Competitive Research (EPSCoR) programs.

3. ***Equity***
The SC-SSI has been establishing standards and benchmarks for equity in the South Carolina SSI design and has been creating an accelerated leadership program in mathematics and science for minority educators. The SSI is expanding Family Math and Family Science statewide.

Important Partners and Alliances

The SC-SSI is collaborating with other state reform initiatives: the South Carolina Council on Educational Collaboration, the South Carolina University Research and Education Foundation, the South Carolina Leadership Academy, the South Carolina Center for the Advancement of Teaching and School Leadership, Preparation for Technologies, the Twelve Schools Project, Accelerated Schools, the Middle School Turning Points Project, the Re:Learning Project, the South Carolina Goodlad Project, BioCom, Dwight D. Eisenhower Mathematics and Science Education Activities, South Carolina's AMP, and the South Carolina NSF EPSCoR. Other partners with Memoranda of Agreement include the South Carolina Council of Teachers of Mathematics, the South Carolina Science Council, the South Carolina Association of Mathematics Supervisors, the South Carolina Science Supervisors Association, ETV, the Cooperative Extension Service, and the South Carolina Junior Academy of Science.

Model Lesson, "How Do Wings Help Planes Fly?" St. Paul's Elementary School in Clarendon District One, South Carolina.

BEST COPY AVAILABLE

South Dakota

Governor: William Janklow

Principal Investigators: John Bonaiuto, Robert T. Tad Perry

Point of Contact: Margo Heinert, Project Director
South Dakota National
Science Foundation
Statewide Systemic Initiative
2510 East Franklin
Pierre, SD 57501-3726
Phone: 605-773-6400
FAX: 605-773-6052

5-Year Award: $7,517,040

Context

South Dakota has a population of slightly over 700,000, with approximately 60,000 Native Americans residing on nine reservations in areas remote from even small population centers. Fifty-one percent of the population is female. Almost 28% of the state's total population is concentrated in its three major cities: Sioux Falls, Rapid City, and Aberdeen. The state's economy focuses on agriculture and ranching, with a marked increase in service industry. Dropout rates for Native American students are 50% to 70%, and their performance on the Stanford Achievement Test ranks in the lowest 4%.

Vision

The South Dakota SSI is driven by the belief that all students in grades K–postsecondary should be able to fully participate in a society that is changing dramatically as a result of rapid, significant advances in mathematics, science, and technology. It envisions schools where the development of mathematics and science concepts is facilitated by the use of hands-on activities, authentic assessment, and the appropriate use of technology. It envisions classrooms that develop the potential of all students; that integrate mathematics, science, and communication skills; that promote flexible scheduling; and that maximize the use of electronic networks. Through postsecondary partnerships, teacher preparation programs encourage the use of technology and promote systemic change.

Strategy

To implement this vision, the South Dakota SSI initiated a program to encourage all teachers at all levels of education to pursue professional development opportunities and expand their mathematics and science curricular offerings. The SSI project concentrates on internalizing world-class mathematics and science standards that are reflected in hands-on teaching and alternative assessments. Using a Curriculum Consultant Team, internal Advisory Committees, a statewide computer bulletin board system, conferences, workshops, and a graduate-credit Teaching Academy, the project has formed an extensive network of K–postsecondary educators committed to systemic reform.

The SSI awards competitive grants to school districts and postsecondary institutions to pursue systemic, community-based reforms that use local leadership, instructional methodologies, and standards. The SSI concentrates its efforts on institutionalizing its program into the state's comprehensive systemic reform efforts.

Accomplishments

1. *Competitive Grants Program*

The SSI provides grants to school districts and postsecondary institutions to establish local models for systemic change in mathematics and science education. Approximately 50% of the state's students are affected by this program. Thirty-one percent of the districts and eight project sites are located on or near major Indian reservations, and the majority of all postsecondary institutions, including two major tribal colleges, are involved.

2. *Training and Conferences*

The SSI sponsors an annual, week-long Teaching Academy on integrating hands-on mathematics, science, and technology in the K–12 classroom; these events provide two hours of graduate credit for 165 teachers, administrators, and higher education faculty. The SSI has hosted a statewide Conference on the Teaching of Undergraduate Mathematics and Science (COTUMS), and more than 30 teachers and SSI staff have spoken at National Science Teachers Association and National Council of Teachers of Mathematics national and regional conferences, at the South Dakota Science and Math Joint Conference, and at other local, regional, and state conferences. In addition, the SSI has provided approximately 100 hours of professional development

National Science Foundation Systemic Initiative

workshops and seminars over the state's Rural Development Telecommunication (RDT) Network—a two-way interactive video/audio network for approximately 1,000 participants located at 13 statewide sites.

3. *Benchmarks and Frameworks*
Over 700 educators have received copies of the *South Dakota Mathematics and Science Benchmarks* for grades 2, 4, 8, and 11 at the annual Mathematics and Science Teachers Conference. The SSI continues to facilitate the ongoing development of these performance expectations, which were first published in September 1992 as a statewide, grassroots effort involving 200 educators from all levels. K–16 educators are drafting curricular frameworks to identify the policy issues, classroom materials, and classroom strategies that are conducive to implementing the Benchmarks.

4. *Assessment*
The SSI is developing and implementing alternative assessment strategies. In 1992, 11,000 students from 25 school districts participated in performance-based assessment; in 1993, 20,000 students from 77 school districts participated; and in 1994, 4,500 students from grades 5, 9, and 12 participated in a random sampling of alternative assessment.

5. *Curriculum Consultants*
K–12 teachers with expertise in mathematics and science, technology, and cultural diversity meet biweekly with school districts (project sites), monitor project site electronic portfolios, develop specific workshops, and address other needs of the project sites to help bridge educational concepts and demonstrate practical teaching methods.

6. *Public Outreach and Awareness*
In collaboration with the South Dakota Department of Tourism, the SSI has initiated a "Learning Doesn't Take a Vacation" public outreach campaign to create an awareness of opportunities for South Dakotans to "experience meaningful and memorable mathematics, science, and technology-based activities year-round." The campaign has reached 20,000 families through mall shows and the state fair, 500,000 families through advertisements in the state's *Vacation Guide*, and 20,000 children through publication of the *Discovery Guide*.

7. *Technological Infrastructure*
The SSI has expanded the technological infrastructure in 80 local districts to include the South Dakota Science and Math Teachers' (SDS&MT) Network, a computer bulletin board system linking K–12 science teachers and university faculty. Over 1,000 network users communicate via email, teleconferencing, and public message bases. In 1995, a new system will be incorporated to supply Internet capability to all users. South Dakota has been selected as one of three initial states to participate in the Science Education Reform for All (SERA) program, a collaborative effort to develop a technological assistance program based on global communications to ensure equitable science and mathematics education for all students.

Important Partners and Alliances

The vision and direction of South Dakota's SSI came about through the statewide collaboration of more than 100 individuals, including parents, teachers, legislators, business leaders, and university faculty and administrators. Efforts have grown to include a host of advocacy groups and agencies, such as the American Indian Committee, the Bureau of Indian Affairs, the Higher Education Council, the Department of Education and Cultural Affairs, the South Dakota School Administrators' Association, the Bureau of Information and Telecommunications, the South Dakota Department of Environment and Public Resources, and the Governor's Office of Economic Development. Maintenance of these broad collaborations is the cornerstone of the state's systemic efforts.

Collaborative learning among elementary students in South Dakota.

Texas

Governor: George W. Bush, Jr.

Principal Investigator: Uri Treisman

Point of Contact: David Hill, Deputy Project Director
Texas Statewide Systemic Initiative
Dana Center
University of Texas at Austin
NSA 1.202
2613 Speedway
University of Texas at Austin
Austin, TX 78712
Phone: 512-471-6190
FAX: 512-471-6193
EMail: wdhill@mail.utexas.edu

4-Year Award: $8,000,000

Context

Texas, a state with a diverse geography and school district size, is the second largest state in population, with over 16,000,000 citizens. Texas has the second largest Hispanic population and the third largest African American population in the United States.

Vision

The Texas SSI's goal is to build the capacity and commitment of local communities to provide all Texas children a contemporary, intellectually-rigorous mathematics, science, and technology education that prepares them for active citizenship and full participation in the state's economy.

Strategy

The Texas SSI's strategic plan has three principal components: (1) policy development and alignment, (2) incentive grants, and (3) capacity building. First, the SSI is spearheading the development of new state mathematics and science frameworks that reflect the best practices of Texas teachers and the emerging needs of an internationally competitive economy. The SSI fosters the constructive interaction of the various constituencies that create and shape school policy in Texas and facilitates the alignment of state policies and policy tools so that educational change can occur responsibly and expeditiously. Second, targeted incentive grant programs aim at facilitating the alignment of local practice with the new state frameworks. Districts compete for grants that will enable them to effectively redeploy their Chapter I and other "formula" and entitlement monies. College and university faculty compete for funding that enables them to link their existing and proposed mathematics, science, and technology education projects with high-priority state and district initiatives. In addition, the initiative creates incentives to promote greater private sector contributions to systemic educational change in Texas. Third, to increase the capacity of Texas schools and districts to enact reform, the SSI is mobilizing a grassroots state leadership that is accustomed to cooperative action, consensus building, and priority setting. Specifically, the SSI develops entrepreneurial advocacy and action groups committed to addressing high-priority state education needs. These human networks will provide the scaffolding for the rapid and efficient dissemination of new educational policies, of new practices, and most importantly, of new beliefs about the possibilities and potentials of schooling in Texas.

Accomplishments

1. ***Policy Leadership***

The Texas SSI is at the center of state mathematics, science, and technology education policy formulation. The SSI plays the lead role in revising the frameworks that set standards for mathematics, science, and technology education in the state and is developing the mathematics and science components for the Texas Goals 2000 plan. Finally, the SSI creates venues for establishing broad-based consensus on educational priorities in Texas.

2. ***Leadership in Teacher Professional Development: Programs***

The Texas SSI assumed responsibility for the management and redesign of the state's discretionary K-12 Eisenhower Program. In addition, the SSI established a new cooperative funding program with the Texas Higher Education Eisenhower program aimed at improving the academic preparation of prospective elementary and middle school teachers.

3. ***Leadership in Teacher Professional Development: State Action Teams***

The SSI mobilized broad-based, entrepreneurial "Action Teams" to:

- redesign and support the implementation of new undergraduate course sequences for prospective elementary and middle school teachers;
- mount comprehensive high school algebra and biology reform initiatives which include multi-faceted professional development strategies for Texas mathematics and science teachers;
- develop high-quality mathematics and science materials for use in family and community settings and to identify novel distribution networks for these materials in cooperation with the Texas business community;
- train and deploy paraprofessionals with cross-training in constructivist mathematics and literacy instructional approaches in K-2 classrooms throughout Texas.

4. ***Incentive Grants Programs***
The SSI created novel incentive programs to encourage (1) school districts to redeploy their Title I and Compensatory Education funds to support the implementation of standards-compatible integrated math, science, and literacy curricula; and (2) higher education faculty to link their educational activities more closely to the state's reform agenda and to make better use of new and emerging strengths of the Texas educational system, e.g., TENET (an electronic network), T-Star (an interactive video-conferencing resource), and the Centers for Professional Development and Technology (a statewide network of centers for supporting field-based teacher professional development).

3. ***Public Information***
The SSI launched a broad-based public education program aimed at developing public understanding and commitment to incremental standards-based education reform in Texas.

Important Partners and Alliances

The Texas SSI entered into formal partnerships with the Office of the Governor, the Texas Education Agency, the Texas Higher Education Coordination Board, the Charles A. Dana Center for Mathematics and Science Education at the University of Texas, the Texas Education Network (TENET), Southwest Educational Development Laboratory, and various other Texas associations, agencies, corporations, and institutions of higher education.

Students at the Allison School in Austin in the Americorps for Math & Literacy program.

Vermont

Governor: Howard Dean

Principal Investigators: Maura Carlson, Laura Gonyeau, Bob Prigo, Bruce Richardson

Point of Contact: Henry Geller, Executive Director
Vermont Institute for Science, Mathematics, and Technology
P.O. Box 310
Randolph Center, VT 05061
Phone: 802-728-4635
FAX: 802-728-3026
EMail: hgeller@ssi.edc.org

5-Year Award: $9,695,922

Context

Vermont, with a population of 567,000, ranks 48th in the nation and is the least populous state east of the Mississippi River. It is a very rural state, with approximately 32% of the population living in two small urban areas. Over 98% of the population is Caucasian. Vermont's major industry is tourism, with agriculture remaining important. The state's economy has boomed with leisure-time industries and high-tech facilities. The Vermont public school enrollment is the smallest in the nation.

Vision

The vision of the Vermont Institute for Science, Math, and Technology (VISMT) is to (1) transform science, mathematics, and technology education in Vermont by dramatically increasing the science and mathematics skills of all Vermont students to high standards, and (2) ensure the ability of all Vermonters to pursue scientific and technical careers.

Strategy

This initiative is a collaborative effort among the education, business, higher education, government, and community sectors. A two-pronged approach couples school-based change efforts with state policy initiatives. To carry out this effort, the Vermont State Board of Education and the Agency for Development and Community Affairs established VISMT.

Accomplishments

1. ***Curriculum and Assessment***
VISMT has worked to ensure implementation of the Vermont Common Core of Learning and has developed the science, mathematics, and technology piece of a statewide integrated curriculum and assessment framework. VISMT has also collaborated with the New Standards Project to test and implement assessment methods, including the mathematics portfolio assessment in grades 4 and 8 which has 100% school district participation. Currently, VISMT is piloting the high school portfolio with 10% of the state's high schools.

2. ***Professional Development***
To date, VISMT has conducted two summer institutes, each two weeks in length, for 225 teachers, principals, and community team leaders, along with two one-week institutes designed for 30 high school mathematics teachers. During each academic year, VISMT has hosted several working conferences for 30 to 200 participants; extensive follow-up is provided, along with new initiatives bringing professional development to the schools. VISMT staff have also participated in activities dealing with equity, business and community partnerships, and technology.

3. ***Teacher Preparation***
VISMT has worked with Vermont colleges and the University of Vermont to examine and improve preservice, inservice, and education curricula. It has also collaborated with the Vermont Department of Education to fund institutions of higher education that are developing courses rich in science, mathematics and technology.

4. ***Information Technology***
VISMT has created regional technology studios in six communities to provide professional development, community access, and classroom use in telecommunications. Through an IBM grant and request-for-proposals process, VISMT established two state-of-the-art technology studios in two high schools. Over 500 teachers attended the annual Vermont Technology Festival. In collaboration with the Vermont Business Roundtable, VISMT hosted Internet training for major business executives throughout the state. VISMT has also offered in-school consultation and training and has facilitated

VISMT
VERMONT INSTITUTE FOR SCIENCE, MATH & TECHNOLOGY

preliminary work toward a statewide telecommunications plan.

5. ***Equity***
VISMT has set up the statewide Equity Advisory Committee, which is composed of 25 Vermonters representing many geographic, socioeconomic, age, and ethnic groups, and has developed equity benchmarks for schools. VISMT has also sponsored a higher education equity grant, assisting Trinity College in developing a more nurturing environment for underrepresented students in science, mathematics, and technology; and supported agro-ecology summer institutes for students and teachers, particularly from rural areas.

6. ***Resource Development***
VISMT successfully raised $989,000 in cash toward its $2,000,000 cash match and over $1,000,000 in in-kind donations from businesses, foundations, and state legislative appropriations. In addition, VISMT established and implemented a public awareness program including a quarterly newsletter, flyers and special publications, an annual report, and media outreach. It also worked with the Vermont Community Foundation to lay the groundwork for a fund to support educational change in the future.

7. ***Business and Community Partnerships***
VISMT has collaborated directly with scores of Vermont businesses to create true educational partnerships in the classrooms and communities. It has awarded grants and provided follow-up community educational projects; created linkages, technical assistance, and advocacy for business and community involvement in science, mathematics and technology education; and formed an active Business/ Community Advisory Council to advise VISMT on future directions.

Important Partners and Alliances

VISMT is a collaborative initiative among five sectors: business, education, higher education, government, and the community at large. Some of the organizations within these sectors include the Vermont State Board of Education, the Vermont Department of Education, the Agency for Development and Community Affairs, the Vermont Educational Telecommunication Consortium (VETC), the Vermont State Telecommunications Council (VSTC), the Vermont Mathematics Coalition, the Vermont Science Teachers Association, the Vermont Committee for Teachers of Mathematics, the Vermont Headmasters' Association, the Vermont Professional Standards Board, the Professional Development Consortium, the Vermont Business Roundtable, the Vermont Business Association for Social Responsibility, the Vermont Chamber of Commerce, the Vermont Women Business Owners Network, the Vermont PTA, and the Vermont School Boards Association.

Grand Isle Science Camp.

Virginia

Governor: George F. Allen, Jr.

Principal Investigator: Joseph D. Exline

Point of Contact: Joseph D. Exline, Project Director
Virginia Department of Education
P.O. Box 2120
Richmond, VA 23216
Phone: 804-225-2876 or
804-371-6198
FAX: 804-786-5466
EMail: jexline@pen.k12.va.us

5-Year Award: $9,615,914

Context

Virginia, with more than 6,000,000 residents, is the 12th most populated state. Its African American population numbers more than 1,100,000. Driven by a growth in small business, the state's population has expanded by more than 15% since 1980. Today, nearly three-quarters of the population lives in metropolitan areas. In the last 50 years, the expansion of government services and the military has fueled a transformation of Virginia's economy away from agriculture. Public school enrollment in this state is over 1,000,000, with minority students composing approximately 28% of the student body.

Vision

The commonwealth's education system is changing to enable all children to meet the difficult demands of living and working effectively in today's scientific and technological society. Unlike traditional programs designed to meet the needs of an industrial society, contemporary education must consider the needs of students by using essential content to develop the critical skills all children need to succeed in life. Enabling students to apply their knowledge is critical; therefore, education must nurture appropriate scientific attitudes and focus on relevant connections across the academic disciplines.

Strategy

To achieve the objectives of the Virginia Quality Education in Sciences and Technology (V-QUEST) Initiative, seven interrelated components have been formed. Composed of representatives from the State Council of Higher Education, the Virginia Community College System, the Virginia Department of Education, institutions of higher education, local school divisions, business and industry, other public and private agencies, and Virginia citizens, Component Teams are working to plan and implement the necessary reforms for mathematics and science education. In some instances, the components serve to connect preexisting, independent efforts within the state. Prominent individuals have been identified as component coordinators to lead each facet. Working closely with the Virginia Department of Education liaisons to V-QUEST, these coordinators have each established Planning Teams.

Accomplishments

1. ***Lead Teachers***
To date, approximately 510 teachers, 240 principals, and 50 central administrators (representing almost 30% of Virginia's 135 school divisions) have participated in lead teacher preparation. Teachers (K–8) received five full weeks of inservice activities; principals (K–8), one full week of inservice activities.

2. ***New Preservice/Inservice Models***
V-QUEST sponsored a competitive request-for-proposals process that generated 10 collaborative proposals from across the state. V-QUEST has funded three collaborations among colleges/universities, community colleges, local school divisions, and business as well as collaborations involving eight institutions of higher education, eight school divisions, and 100 teachers (9–12).

3. ***Instructional Materials***
V-QUEST has convened representatives of 15 states in a series of national conferences, teleconferences, audioconferences, and miniconsortium meetings to develop an instructional materials evaluation instrument, as well as criteria and indicators to influence exemplary mathematics and science curriculum development. Other participants included six national professional mathematics and science organizations, more than 20 textbook publishers, and technology (e.g., video, multimedia, computing, distance learning) providers.

4. ***Administrative Leadership***
V-QUEST cosponsored (with the Virginia Council of Teachers of Mathematics) a miniconference for

Virginia Quality Education in Sciences and Technology

administrators, produced a video to highlight the administrator/supervisor's role in reform, and planned, developed, and conducted Architectural Renaissance, a 21st-century school facility design conference for administrators. In addition, V-QUEST has begun developing a handbook for administrators.

5. *Community Action*
Accomplishments include hiring Regional Action Council directors in three of the eight Superintendent's Regions to create awareness within the communities and develop action plans; organizing a V-QUEST speakers bureau composed of 16 volunteers from a variety of business, education, government, and community organizations; and sending thousands of copies of the *Community Action Handbook* to various schools and business organizations.

6. *Student Assessment*
V-QUEST has developed a set of assessment evaluation criteria that were used by the Virginia Department of Education's Assessment Team to formulate a set of criteria for statewide assessment. V-QUEST has also compiled a set of mathematics and science assessments, planned and delivered a summer 1993 Assessment Institute for 40 teachers, and held a follow-up institute in 1994.

7. *Communications/Technology*
The effective and integrated use of technology is promoted throughout all V-QUEST components. Accomplishments to date include developing multiple print and visual materials to assist the seven component coordinators and the project director in communicating the V-QUEST goals, producing several videos for use by the Lead Teacher component for inservice or classroom use, and producing videos about V-QUEST, the Lead Teacher Component, the Administrative Support Component, and the Assessment Component.

3. *Project Administration*
To date, V-QUEST has built support for its reforms with key government, community, education, and legislative representatives; conducted two annual V-QUEST conferences for a total of over 1,500 educators; and held multiple awareness and action meetings with high-level education and legislative leaders (e.g., the Executive Policy Board, the State Action Council).

9. *Equity*
V-QUEST's equity goals include eliminating the academic performance gap between Virginia's low-achieving students and the high performance standards set for all students by providing access to effective opportunities to learn and by affecting change in school policies, curricula, classroom instruction, assessment, teacher education, and community and parent involvement. At present, V-QUEST is undergoing an equity review, which will help form the basis for its Equity and Access Strategic Plan. While grounded in the ongoing collection of aggregated qualitative and quantitative data, this review highlights the connected approach components will be taking in moving toward V-QUEST's equity and access goals.

Important Partners and Alliances

V-QUEST has benefited from partnerships with individuals and organizations, especially in the private sector, including the Laboratory of Chemical Evolution (Department of Chemistry, University of Maryland), the Continuous Electron Beam Accelerator Facility, NASA's Langley Research Center, the Virginia Polytechnic Institute and State University, the Virginia State Council of Higher Education, WHRO Public TV, the Regional Academic Governor's Schools, the University of Virginia's Office of Government Relations, and the Fairfax County Public Schools. V-QUEST also features strong support from the governor, legislature, schools, and communities.

Students get excited by technology in Virginia.

Appendix

Principal Investigators with Positions/Affiliations in Addition to SSI

This list includes non-SSI titles and affiliations of SSI Principal Investigators, illustrating the comprehensive, broad-based support and involvement of the SSI community members.

Aguilar, Teresita	Equity/Diversity Consultant, University of Lincoln, Nebraska	Nebraska
Bailey, Lee	Supervisor, Secondary Mathematics, Brevard County Schools	Florida
Baird, Thomas	Project Director, SSI (only)	Florida
Barnes, Marianne B.	Associate Professor of Science, University of North Florida	Florida
Bartels, Dennis	Special Assistant, Division of Development, South Carolina Department of Education	South Carolina
Bermúdez, Germán	Associate Science Consultant, Connecticut Department of Education	Connecticut
Berry, Fran	Principal Investigator, SSI (only)	Colorado
Bonaiuto, John	Secretary, South Dakota Department of Education and Cultural Affairs	South Dakota
Boysen, Thomas	Commissioner of Education, Kentucky Department of Education	Kentucky
Burke, Maurice	Associate Professor of Mathematics Education, Department of Mathematical Sciences, Montana State University	Montana
Carlson, Maura	Co-Director of the Vermont Elementary School Project, Trinity College	Vermont
Carpenter, John	Director, Center for Science Education, University of South Carolina	South Carolina
Christensen, Doug	Deputy Commissioner of Education, Nebraska Department of Education	Nebraska
Cooper, Walter	Regent of the University of the State of New York	New York
Cronn, Dagmar	Dean, College of Science, University of Maine	Maine
Crowe, Edward	Senior Associate Director, Arkansas Department of Education	Arkansas
Curry, James	Professor of Mathematics, University of Colorado, Denver	Colorado
Davidson, Kerry	Senior Deputy Commissioner, Louisiana Board of Regents	Louisiana
DiMarco, Maureen	Secretary of Child Development and Education, Office of the Governor of California	California
Driscoll, David	Deputy Commissioner of Education, Massachusetts Department of Education	Massachusetts
Dyasi, Hubert	Director, Workshop Center, City College of New York	New York
Exline, Joseph	Associate Director of Science, Virginia Department of Education	Virginia
Fessenden, Rol	Director of Inventory Control, L.L. Bean	Maine
Friel, Susan	Director, University of North Carolina Mathematics and Science Education Network (MSEN)	North Carolina
Goldin, Gerald	Director of the Center for Mathematics, Science, and Computer Education, Rutgers University	New Jersey
Gómez, Manuel	Director of the Puerto Rico Resource Center for Science and Engineering	Puerto Rico

Gonyeau, Laura	Chairperson of the Mathematics Department, Bellows Free Academy	Vermont
Hamlett, Bruce	Executive Director of the Commission on Higher Education	New Mexico
Heikkinen, Henry	Professor of Science, University of North Colorado	Colorado
Helms, Doris	Chair of the College Board Science Advisory Committee, Professor of Biology, Clemson University	South Carolina
Houlihan, Tom	Education Advisor to the Governor, Office of the Governor	North Carolina
Hugine, Andrew	Professor of Mathematics, South Carolina State University	South Carolina
Hunt, Harvey	Deputy Superintendent for Curriculum and Instructional Leadership, California Department of Education	California
Huray, Paul	Carolina Distinguished Professor of Physics and Engineering, University of South Carolina	South Carolina
Johnson, Henry	Assistant State Superintendent, Instructional Services, North Carolina Department of Public Instruction	North Carolina
Johnson, Larry	Professor of Mathematical Sciences, Director of the Center for Mathematics, Science, and Environmental Education, Metropolitan State College, Denver	Colorado
Jones, Graham	Executive Director of the New York State Science and Technology Foundation	New York
Julian, Diana	Deputy Director, Arkansas Department of Education	Arkansas
Kahle, Jane Butler	Condit Professor of Science Education, Miami University	Ohio
Kaye, Judith	Group Leader, Science Education and Outreach, Los Alamos National Laboratory	New Mexico
Kean, Elizabeth	Associate Professor, Department of Curriculum and Instruction, University of Nebraska, Lincoln, Director of the Center for Science, Mathematics, and Computer Education	Nebraska
Keller, Thomas	Science Education Specialist, Division of Instruction, Maine Department of Education	Maine
Kellogg, Nancy	Principal Investigator, SSI (only)	Colorado
Latanision, Ron	Professor of Materials Science and Engineering, Chairman of Council on Primary and Secondary Education, Director, H.H. Uhlig Corrosion Laboratory, Massachusetts Institute of Technology	Massachusetts
Laughlin, Richard	Deputy Commissioner of Education, Colorado State Department of Education	Colorado
Leinwand, Steve	Mathematics Consultant, Connecticut Department of Education	Connecticut
LeMahieu, Paul	Director, Delaware Education Research and Development Center	Delaware
Lewis, Jim	Professor and Chair, Department of Mathematics and Statistics, University of Nebraska, Lincoln	Nebraska
Lott, Johnny	Research Professor, Department of Mathematical Sciences, The University of Montana	Montana
Lubetkin, Rebecca	Executive Director of the Consortium for Educational Equity, Rutgers University	New Jersey
Luedeman, John	Director for the Center of Excellence in Mathematics and Science Education, Professor of Mathematical Sciences and Education, Clemson University	South Carolina
McCarroll, Walter	Vice President for School Partnerships, The Edison Project	Florida

Meno, Lionel	Commissioner of Education, Texas Education Agency	Texas
Mitchell, Jackie	Mathematics Specialist, Division of Instruction, Maine Department of Education	Maine
Muri, Mari	Mathematics Consultant, Connecticut Department of Education	Connecticut
Padilla, Michael	Professor, Science Education, University of Georgia	Georgia
Perry, Robert	Executive Director of the South Dakota Board of Regents	South Dakota
Priest, Jeffrey	Director of Central Savannah River Area (CSRA) Hub, University of South Carolina - Aiken	South Carolina
Prigo, Bob	Professor of Physics, Middlebury College	Vermont
Randolph, Carolyn	Chairperson of the South Carolina Science Frameworks Writing Team	South Carolina
Richards, William	Superintendent of Schools, Maine School Administrative District 43	Maine
Richardson, Bruce	Deputy Commissioner, Vermont State Department of Education	Vermont
Rubenfeld, Lester	Professor of Mathematical Sciences, Rensselaer Polytechnic Institute	New York
Rudy, Eloise	Independent Mathematics Consultant, Chairperson of the South Carolina Science Frameworks Writing Team	South Carolina
Schechter, Ellen	Assistant Commissioner. Division of Academic Programs and Standards, New Jersey Department of Education	New Jersey
Scofield, Sandra	Principal Investigator (only)	Nebraska
Silevitch, Michael	Professor of Electrical and Computer Engineering, Director of the Center for Electromagnetics Research, Director of the Center for the Enhancement of Science and Mathematics Education (CESAME), Northeastern University	Massachusetts
Sobel, Thomas	Commissioner of Education, New York State Education Department	New York
Staten, Teressa	Chief Deputy Superintendent, Michigan Department of Education	Michigan
Switkes, Ellen	Assistant Vice President for Academic Advancement, University of California, Office of the President	California
Thomas, John	Executive Director, Glaxo Foundation, Glaxo, Inc.	North Carolina
Thompson, Thomas	Assistant Professor, South Carolina SSI, University of South Carolina	South Carolina
Thornton, Melvin	Professor of Mathematics and Statistics, University of Nebraska, Lincoln	Nebraska
Todd, Jr., Lee	President and Chief Executive Officer, Databeam Corporations	Kentucky
Treisman, Uri	Director, Charles A. Dana Center for Mathematics and Science Education, University of Texas - Austin	Texas
Veath, Lois	Professor of Physics, Chadron State College	Nebraska
Walgren, Timothy	Director of China Development, Alumax Manufacturing Company	South Carolina
Weinberg, Steve	Science Consultant, Connecticut Department of Education	Connecticut
Whitley, John	Manager, Educational Outreach, Sandia National Laboratory	New Mexico
Wilson, Kenneth	Hazel C. Youngberg Trustees Distinguished Professor, Ohio State University	Ohio
Zamora, Albert	Associate Superintendent of Learning Services, New Mexico State Department of Education	New Mexico

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Arlington, VA 22230

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